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Report To Congress Section 112(r)(10) Clean Air Act As Amended

Prepared in coordination with the
National Response Team
by the
Chemical Emergency Preparedness and Prevention Office

NRT

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PRESIDENTIAL REVIEW
EXECUTIVE SUMMARY

INTRODUCTION

Congress, in the Clean Air Act as amended in 1990, responded to a widespread perception that the federal system for protecting the public and the environment from hazardous materials is overly complex and unwieldy. Section 112(r)(10) requires a review of federal agency authorities and coordination responsibilities for release prevention, mitigation, and response. This report fulfills the Congressional mandate. It was undertaken by the Environmental Protection Agency in coordination with the National Response Team which is comprised of the fifteen federal agencies responsible for federal preparedness and response to hazardous substances and oil spills.

The review describes the federal safety system in place today to protect the public and the environment from significant accidents involving hazardous materials. The review concludes that, while achieving its statutory goals, the system is both complex and costly. This review illustrates complexities, inefficiencies, and the confusion caused by the existing hazardous materials safety system for both the regulated community and the regulators. It identifies key issues that need to be addressed if the system is to be improved.

The report recommends a second phase to focus on the technical implications of the issues identified in this document and to obtain key stakeholder participation in recommending needed changes. State and local governments, the regulated community, and other interested parties must be involved in the development of any meaningful and effective changes to the hazardous materials safety system. The fundamental issues identified for this second phase include: the multiple statutory terms for regulated substances and reportable events; multiple and overlapping hazard classification systems; multiple requirements for facility plans; and the inefficient and inconsistent accident data collection and management systems. This second phase is intended to identify specific statutory changes and to make further recommendations that should be implemented by the Executive Branch to improve administration of the safety system.

DEFINITIONS

For this report, hazardous materials were considered generically to include all hazardous substances, hazardous chemicals, toxic substances, pollutants, contaminants, wastes, oil and other petroleum-based products, and radioactive materials. For purposes of this report, "accidental" releases were used to define the scope of the study, recognizing that accidents may include intentional acts such as deliberate dumping, terrorism, or sabotage. Unless otherwise indicated, "response" is defined as the immediate short-term actions generally taken in the initial hours or days following a release to mitigate the effects of a release. "Hazardous materials safety" refers to accident release prevention, preparedness, mitigation, and response measures; "emergency" refers to an incident that, without response, has the potential for severe, short-term adverse effects on human health or the environment. "Preparedness" is included on an equal basis with prevention and response. "Mitigation" is treated as an integral part of all three.

HAZARDOUS MATERIALS SAFETY SYSTEM AND THE FEDERAL ROLE

The hazardous materials safety system has evolved throughout this century with an increasing number of laws enacted in the past two decades. The current system is a composite of laws, regulations, and programs pieced together and administered by numerous agencies at all levels of government. In order to protect workers, the public, and the environment, the safety system addresses all phases of the life of a hazardous material -- from design, production, storage, transportation, and use to recycling and disposal.

While each piece of this composite was intended to address a specific, necessary safety goal, components of the system were not created or developed in consideration of one another. The laws have addressed specific constituencies for specific purposes. As a result, overlaps, inefficiencies and some gaps in the statutory and regulatory framework and in the federal government's management structure exist, causing the system to be unnecessarily burdensome and confusing for government, industry, and the public. While the study did not look at costs, it seems apparent that inefficiencies and redundancy unnecessarily increase the cost of the system and that streamlining the system would reduce its cost. Without a larger look at the safety system, continued enactment of laws that include safety provisions, regardless of their impact on the existing system, will further complicate the regulatory structure, and may not improve safety.

Preventing accidents involving hazardous materials is a primary responsibility of the regulated community. Recognizing this, the regulated community complies with a myriad of regulations from different federal, state, and local agencies. Most businesses producing or using hazardous materials are subject to a range of safety-related regulations that affect the management of these materials from cradle to grave. The federal role for accident prevention is to provide:

- Minimum safety standards;
- Incentives to comply with these standards;
- Guidance on how to comply; and
- Enforcement against those who fail to fulfill this role, including penalties and liability for such failures.

In addition to its regulatory role, several agencies of the federal government have also initiated voluntary programs with industry, expanding upon the regulatory approach. Federal prevention responsibilities for hazardous materials are primarily directed toward the development and enforcement of regulations and standards that affect transportation safety, workplace safety, and environmental and community safety. Safety-related regulations govern: packaging and labeling of the product for shipment and use; training workers for emergency response; alerting workers to hazards from exposure; practices for safe and proper waste disposal; developing emergency contingency plans; reporting requirements in case of spills or releases; developing plans to manage risk; and providing information to workers, responders, planners, and the public. All of these requirements, administered by a number of different federal agencies, are in addition to all other environmental and health regulations and all other government regulations at the federal, state and local level. Tracking, understanding, and implementing this panoply of federal requirements is becoming increasingly difficult.

Preparing for and responding to hazardous materials accidents is fundamentally the responsibility of employers as well as local and state governments. The needs of state and local planners and responders for information, assistance and support in the modern chemical age have increased substantially. Multiple federal regulations govern how planners and responders perform their tasks. These regulations pertain to:

- Identification of hazardous materials in the community;
- Identification of the particular hazards presented by the materials;
- Local contingency plans and planning coordination;
- Emergency response training;
- Accident notification and reporting; and

- Requirements that the regulated community submit information on hazardous materials to the local planning group.

Contingency planning by the federal government and its response to hazardous materials emergencies is geared to large and fortunately rare events. Because the majority of responses to hazardous materials emergencies are conducted and completed by industry, and local and state authorities, federal initiatives to support state and local planning and response are of primary importance.

Based on this review of statutes, regulations and federal agency activities, the federal role in preparedness is to provide:

- A level of safety for all citizens;
- Guidance, technical assistance and expertise;
- Coordinated training opportunities and exercises, including first responders;
- Limited financial support to state and local governments for planning and training;
- National and regional contingency plans; and,
- Coordination of federal plans with state and local plans for effective response.

The federal role in response is to:

- Assist state and local governments in a response, when necessary, to ensure that response actions are protective of public health and the environment;
- Provide necessary expertise and resources when the magnitude of an accident exceeds the capabilities and resources available locally;
- Ensure that responsible parties are held accountable for conducting appropriate cleanup actions and/or reimbursing the federal government for cleanup costs; and
- Establish and maintain information regarding accidents and their consequences.

While federal regulations that guide local planning and response are intended to provide important safety measures, the complexity of the federal regulatory system often complicates the task. Concern about the impact on planners and responders, as well as the regulated community, serves as a primary context for the issues addressed in this report.

THE HAZARDOUS MATERIALS ACCIDENT PICTURE

Hazardous materials accidents happen frequently. The vast majority of these accidents are handled by local and state authorities. In 1991, over 35,000 calls for transportation and fixed facility incidents potentially involving hazardous materials were received at the National Response Center, the federal government's primary notification center. The 35,000 notifications do not include numerous notifications reported only to local officials, nor do all the calls necessarily reflect emergency situations.

While the number of releases reported to the federal government for transportation and fixed facility incidents is increasing, data are not readily available to substantiate whether a trend of increasing accidents is

occurring, (i.e., whether the number of accidents measured or normalized by production rates, usage or commodity transportation rates, is increasing). Some of the increases may be attributable to growth in the number of chemical shipments by small carriers, outreach efforts to improve reporting, and more recent laws that have increased the scope of reportable releases or required additional reporting. The absence of measurements to determine compliance with accident reporting, complicates the government's ability to identify and evaluate overall accident trends.

The number of casualties in the U.S. resulting from accidents involving hazardous materials has been low, according to federal accident data. While the likelihood of catastrophic events resulting in significant casualties is low, if such events occur the resulting consequences may be extensive. For the period between 1987 and 1991, 55 fatalities and 1252 injuries, attributable to the hazardous materials involved in the incident, occurred in interstate transportation. All fatalities (during that time period) occurred on the highway. Between 1987 and 1991, the Occupational Safety and Health Administration conducted investigations of 467 chemically-related accidents that resulted in 453 worker fatalities, and 1,566 worker injuries, 877 of which required hospitalization, that were attributable to the hazardous materials involved in the incident. In contrast to fatalities resulting from hazardous materials accidents, over 41,000 fatalities were reported for highway vehicular accidents in 1991.

A study of accident severity from a five-year period in the mid-1980s from the Acute Hazard Events Database combined those events resulting in six or more fatalities, 25 or more injuries, and evacuations of 2,500 people or more into a group representing approximately 150 events. While analysis of long-term health effects was not included, this study showed that the scale of recent U.S. experience is much less severe than the worst cases world-wide. Historically similar patterns were identified: toxic, fire, and explosion hazards were active contributors to most accidents with serious adverse consequences.

The Department of Transportation collects information on property damages resulting from accidents involving hazardous materials [1]. Beginning in 1990, carriers reporting such damages to DOT began specifying the types of damages incurred, e.g., product loss, decontamination and clean-up costs, etc. For the five years 1987-1991, approximately $141 million in damages were reported to DOT from all modes of transportation. These damage estimates do not include costs of damages resulting from the 1989 Exxon Valdez disaster.

A private sector study[2] of property losses resulting from accidents and natural phenomena in the hydrocarbon processing and chemical industries showed that over a thirty-year period, (1959-1988) more than $5 billion in property damage, adjusted for inflation, resulted from the 150 major accidents examined. The study also indicated that the costs and number of losses were increasing. While improved reporting accounts for some of the increase, the study cited a potentially more significant force behind the trend of increases in losses -- the ever greater concentration of assets to achieve economies of scale in these capital intensive industries. In more recent years, two significant accidents have resulted in serious damages — the Exxon Valdez oil spill (1989) and the Phillips Refinery explosion (1990). While definitive data on damage costs are not easily ascertained, estimates for Exxon Valdez damage have been reported to exceed at least $2 billion. Damages from the Phillips catastrophe are reported to exceed $700 million. While losses of catastrophic proportion are relatively rare, the very nature of operations of the hydrocarbon processing and chemical industries presents the potential for events that can severely affect employees, the public, the environment, corporations, and shareholders.

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[1] These numbers do not include costs associated with environmental damage such as decreased fishing and recreational activity and resulting water contamination nor do they include litigation costs. These costs would add significantly to the losses cited.

[2] The information on property losses was obtained from an article appearing in the Oil and Gas Journal, August, 1990, by Marsh & McLennan Protection Consultants.

STATUTORY AND REGULATORY FRAMEWORK

The hazardous materials accident prevention, preparedness and response system is an amalgam of statutory and regulatory systems, often developed for non-safety related purposes and adapted to the mission of protecting the public and the environment from hazardous materials accidents. Many of these laws have been developed as a result of a specific event rather than in the context of the overall safety system. Accident prevention, preparedness, and response provisions in at least twenty five different laws establish the current accident safety system.

Prevention

Hazardous materials safety regulations for accident prevention address: (1) transportation safety; (2) worker protection; and, (3) environmental and public protection. For this report, the regulatory framework for hazardous materials safety within three primary departments and agencies with safety responsibility was reviewed: the Department of Transportation (DOT), including the Research and Special Programs Administration (RSPA) and the U.S. Coast Guard (USCG); the Environmental Protection Agency (EPA); and, the Occupational Safety and Health Administration (OSHA) within the Department of Labor.[3] Federal accident prevention programs for transportation have been in effect the longest, followed by worker protection programs and environmental and community protection. Together, these programs represent the prevention component of the hazardous materials safety system.

Agency Roles/Prevention

DOT/RSPA -- Within DOT, umbrella authority for regulation of hazardous materials transportation enables the RSPA Office of Hazardous Materials Safety to develop policies pertinent to all transport modes. Each transportation modal administration administers hazardous materials regulations specific to its needs. Because of the multiple points of exposure during transport, different transport handlers, and the multitude of first responders, the premise underlying DOT regulations is to prevent accidents through sound containerization and handling, and when accidents occur, to have materials easily identified for response personnel. In addition to regulating hazardous materials transportation, DOT/RSPA also regulates pipeline safety through its Office of Pipeline Safety. The primary statutes governing DOT's regulatory responsibilities for transportation of hazardous materials include: Hazardous Materials Transportation Act, the Hazardous Materials Transportation Uniform Safety Act, the Natural Gas Pipeline Safety Act, the Hazardous Liquids Pipeline Safety Act, the Oil Pollution Act, and the Comprehensive Environmental Response, Compensation, and Liability Act.

DOT/USCG -- The Coast Guard maintains regulatory authority for bulk transport by water. Because authority for transportation by navigable waters has historically been a federal responsibility, the Coast Guard exercises a unique and broad jurisdiction over the shipping industry. In general, its regulations control vessel design, operations, pollution prevention, personnel qualifications, and a number of other categories. Safety and accident prevention are inherently a part of each aspect of the Coast Guard's regulatory structure. The primary statutes governing USCG's regulatory authority include the Port and Waterway Safety Act, the Tanker Safety Act, the Oil Pollution Act, the Federal Water Pollution Control Act, and the Ports and Harbors Safety Act.

EPA -- EPA's regulatory authority is split among a number of different environmental statutes, some of which address specific media and long-term environmental problems and others that address near-

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[3] Detailed examination of safety regulations pertaining to nuclear materials regulated by the Nuclear Regulatory Commission and food and consumer products regulated by the Food and Drug Administration are not within the scope of this report.

term accident related initiatives as well as long-term environmental issues. EPA's mission is directed toward comprehensive protection of the public and the environment. The statutes granting EPA's accident prevention authorities include: the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Clean Air Act (CAA); the Resource Conservation and Recovery Act (RCRA); the Oil Pollution Act of 1990 (OPA); the Federal Water Pollution Control Act (FWPCA); the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); the Toxic Substances Control Act (TSCA); Superfund Amendments and Reauthorization Act (SARA); and the Emergency Planning and Community Right-to-Know Act (EPCRA). These statutes contain multiple statutory definitions governing the regulated community and regulated substances, as well as mandating a number of hazardous materials lists.

While all of these statutes and resulting regulations contain important aspects for preventing hazardous materials accidents, until the accident in Bhopal, India, EPA did not have a formal accident prevention program. The impetus for preventing accidents had historically been with the private sector, primarily from liability and insurance concerns. After Bhopal, EPA recognized that a more formal program was needed and began to develop expertise in accident prevention issues as a corollary to its accident preparedness and response programs. EPA's Chemical Safety Audit program is designed to identify problems as well as effective safety practices for accident prevention, and to share this information with industry and the public. Additionally, EPA's Accidental Release Information Program has targeted facilities with significant hazardous materials releases and collected information regarding the causes of accidents and the measures taken for preventing future releases. This information is also shared with industry and the public. These two programs provide an important foundation for fulfilling EPA's role in accident prevention, in addition to EPA's more recent prevention efforts mandated by the Clean Air Act, as amended in 1990, as discussed below.

OSHA -- OSHA's regulatory efforts are designed specifically to protect the worker throughout the different phases in the life cycle of a hazardous material. Unlike other industrial hazards in which safety engineering practices could be studied and standardized for a given industry, hazardous materials activities like development, production, storage, transportation, use, recycling, and disposal are undertaken by a host of workers. Therefore, OSHA's regulatory approach is concerned about all of these activities as a total system, which is the Process Safety Management Standard. This Standard is designed to prevent unwanted releases of hazardous materials and is concerned with the technology, the operations, the maintenance, the emergency preparedness, the training and all other activities. It targets employers who use and store highly hazardous chemicals that have the potential of causing a catastrophic incident, and considers Process Hazards Analysis as the most important element in the Process Safety Management Program.

Worker exposure to hazardous materials accidents are typically greater than public exposure to similar incidents, because of worker proximity. Other OSHA standards include the Hazard Communication Standard and the Hazardous Waste Operations and Emergency Response Standard (HAZWOPER). HAZWOPER is intended to protect workers who are specifically assigned to responding to or cleaning up hazardous material accidents. OSHA's regulatory authority is derived from the Occupational and Safety Act of 1970; the Superfund Amendments and Reauthorization Act (Section 126) of 1986; and the Clean Air Act Amendments of 1990. This last Act requires that the Process Safety Management Standard include a list of highly hazardous chemicals identifying the toxic, flammable, highly reactive, and explosive substances.

Like OSHA's Process Safety Management Standard, EPA was also mandated under the Clean Air Act Amendments of 1990 to develop a regulation similar in scope and purpose. Each agency's program requires industry to develop chemical process safety provisions, including risk analysis and contingency planning. Some differences exist in the statutory language, the hazards addressed, and the implementation procedures for the two programs. EPA and OSHA are required to coordinate and consult with each other in the development of their respective programs.

Preparedness/Response

The primary responsibility and activities for preparedness and response to incidents involving hazardous materials is with employers and with the local and state levels of government. The federal government, however, must be prepared to respond to those emergencies that exceed local and state resources and capabilities. Federally mandated contingency planning, response authorities, and programs fall under three distinct, though inter-related systems and involve coordination of between 15 and 27 federal departments and agencies in any one of the federal systems. Like the statutory framework for prevention, authority for these systems is derived from a number of different statutes. In addition, several state and local contingency plans and planning requirements are mandated by federal statute, or as a condition of financial assistance. A number of different facility contingency plans required by federal statute are also a part of the preparedness and response framework. The statutes that address contingency planning at any of these levels include CERCLA, SARA, EPCRA, RCRA, FWPCA, OPA, Stafford Act, CAA, Federal Civil Defense Act, and the Nuclear Regulatory Commission Appropriations of 1980.

Of the three primary federal contingency planning systems for emergency preparedness and response, the first, codified in 1972, is the National Oil and Hazardous Substances Pollution Contingency Plan, also called the National Contingency Plan (NCP). It is designed to address specifically hazardous substances and oil pollution incidents. The second, the Federal Radiological Emergency Response Plan (FRERP), addresses significant radiological emergencies; and the third, the Federal Response Plan (FRP), was developed for any type of catastrophic disasters. The NCP and FRERP also provide the framework for oil and hazardous substances and radiological components of the FRP. The NCP may be activated for a radioactive materials emergency not covered by the FRERP.

Each plan has its own coordinating mechanism in the event of its activation: for the NCP -- the National Response Team (NRT) (15 agencies)[4]; for the FRERP -- the Federal Radiological Preparedness Coordinating Committee (17 agencies)[5]; for the FRP during activation -- the Catastrophic Disaster Response Group (up to 27 agencies).[6] The National Contingency Plan also has equivalent coordinating bodies at the regional and area levels. The Regional Response Teams include state and, in some cases, local representation.

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[4] The following agencies comprise the National Response Team: Department of Agriculture, National Oceanic and Atmospheric Administration within the Department of Commerce, Department of Defense, Department of Energy, Environmental Protection Agency, Federal Emergency Management Agency, General Services Administration, the Agency for Toxic Substances and Disease Registry within the Department of Health and Human Services, Department of the Interior, Department of Justice, the Occupational Safety and Health Administration within the Department of Labor, Nuclear Regulatory Commission, Department of State, Department of Transportation, including the United States Coast Guard.

[5] The following agencies make up the Federal Radiological Preparedness Coordinating Committee: Department of Agriculture, Department of Commerce, Department of Defense, Department of Energy, Department of Health and Human Services, Department of Housing and Urban Development, Department of Interior, Department of Justice, Department of State, Department of Transportation, Department of Veterans Affairs, Environmental Protection Agency, Federal Emergency Management Agency, General Services Administration, National Aeronautics and Space Administration, National Communications System, and the Nuclear Regulatory Commission.

[6] The following agencies make up the Catastrophic Disaster Response Group. A "P" denotes a primary agency, responsible for management of the Emergency Support Function (ESF): Department of Agriculture (P), Department of Commerce, Department of Defense (P), Department of Education, Department of Energy (P), Department of Health and Human Services (P), Department of Housing and Urban Development, Department of the Interior, Department of Justice, Department of Labor, Department of State, Department of Transportation (P), Department of the Treasury, Department of Veterans Affairs, Agency for International Development, American Red Cross (P), Environmental Protection Agency (P), Federal Communications Commission, Federal Emergency Management Agency (P), General Services Administration (P), Interstate Commerce Commission, National Aeronautics and Space Administration, National Communication System (P), Nuclear Regulatory Commission, Office of Personnel Management, Tennessee Valley Authority, and U.S. Postal Service.

representation. The Area Committees plan for a coordinated community response and are comprised of federal, state, and local government agency members. In addition, when government agencies function as facilities with hazardous materials activities, there are facility emergency response systems, as well as specific systems and plans to deal with certain special situations.

Although most agencies with regulatory responsibility investigate accidents, three federal investigatory boards (one of which has not yet been appointed) are primarily responsible for investigating accidents or existing procedures, and making recommendations on improvements to the accident preparedness, prevention, or response systems. The National Transportation Safety Board investigates hazardous materials and radiological accidents in transportation and pipelines, as well other transportation accidents; the Defense Nuclear Facility Safety Board investigates process and design safety at Department of Energy defense nuclear facilities; and the Chemical Safety and Hazard Investigation Board authorized in 1990 under the CAA will investigate chemical accidents at fixed facilities.

Federal Agency Roles/Preparedness and Response

NCP -- EPA/Coast Guard and Other NRT Agencies. Under the NCP, EPA and the Coast Guard are the primary response agencies when federal response to an incident involving the release of oil or hazardous materials is required. In addition, EPA chairs the National Response Team and the Coast Guard serves as Vice-Chair. EPA has primary federal jurisdiction when hazardous substances or oil spill emergencies occur in the inland zone, as defined by the National Contingency Plan. EPA also provides support for local contingency planning efforts and local and state responders when incidents exceed local/state response capabilities for responding. The Coast Guard has jurisdiction for response to accidents in the coastal zone and possesses trained personnel and equipment necessary for response to such spills.

Primary authority for federal contingency planning and response to hazardous materials accidents is derived from the Federal Water Pollution Control Act, the Comprehensive Environmental Response, Compensation and Liability Act, and more recently, the Oil Pollution Act. The National Contingency Plan is the vehicle for developing national emergency preparedness and response policy and procedures and the National Response Team is the primary policy coordinating body and interagency support system during a federal response.

FRERP -- FEMA/DOE/NRC and Other FRERP Agencies. Using various statutory authorities, several different agencies are involved in planning and response to significant accidents involving radioactive materials. The plan used by the federal government to respond to peacetime radiological emergencies is the FRERP coordinated by the Federal Emergency Management Agency (FEMA). Under the FRERP, the character of the event determines which agency will be the Lead Federal Agency in charge of a response. The Nuclear Regulatory Commission, Department of Energy, Department of Defense, Environmental Protection Agency, or National Aeronautics and Space Administration may be the Lead Federal Agency.

FRP -- FEMA and Other FRP Agencies. The Disaster Relief Act of 1974 authorized the President to assist states and local governments in disasters that exceeded their response and recovery capabilities. In 1988, the Robert T. Stafford Disaster Relief and Emergency Assistance Act amended the Disaster Relief Act to address catastrophic disasters. Upon the request of a Governor, the President may declare a major disaster and appoint a Federal Coordinating Officer. In the event of a catastrophic disaster, the Federal Response Plan (FRP) developed for such purposes, would be activated. Such disasters may include hazardous materials emergencies. Because the FRP is divided into functional units, called Emergency Support Functions, different problems, such as hazardous materials incidents that may occur in a catastrophic situation, may be addressed. The NCP or FRERP would be activated to address those situations. In the event of a catastrophic hazardous materials emergency, the NCP would be activated. Because such an emergency, by definition, would require additional federal assistance, a state's governor would probably request a disaster declaration, thus the FRP would be activated.

Federally-Mandated State/Local Contingency Plans

Several different federal statutes have been used to derive authority for state and local contingency planning for emergency response to incidents involving hazardous materials, and one statute, the Emergency Planning and Community Right-to-Know Act (EPCRA), requires local hazardous materials contingency planning. Through EPCRA provisions, local planners obtain information about hazardous materials in their communities. A number of different federal agencies provide a variety of training programs for state and local contingency planning and for emergency response to incidents involving hazardous materials. The recently enacted Hazardous Materials Transportation Uniform Safety Act (HMTUSA) created a funding mechanism and required the development of a grant program for emergency planning and training. EPCRA and HMTUSA are two significant pieces of legislation that support local and state responsibility for contingency planning and emergency response. Additionally, the Oil Pollution Act requires area contingency planning that must involve state and local participation on the planning committee.

The Civil Defense Act is used by FEMA to authorize the development of local and state "All Hazards" Emergency Operations Plans. Similarly, the 1980 Nuclear Regulatory Commission Appropriations Act is used by FEMA to authorize and maintain a state and local contingency planning system in communities surrounding commercial nuclear power plants. DOD provides funding to FEMA for grants to develop state and local preparedness programs in areas surrounding the chemical weapons storage and incineration sites in the U.S. This program is known as the Chemical Stockpile Emergency Preparedness Program.

Facility Contingency Plans

A number of statutes and regulations, administered by several federal agencies, address requirements for facility contingency plans. The statutes that contain or result in provisions for facility contingency plans include: Occupational Safety and Health Act, Resource Conservation and Recovery Act, Atomic Energy Act, Oil Pollution Act, Clean Air Act, and the Clean Water Act. These plans are consistent in some respects while differing in others. The facilities covered by these requirements include waste generators, chemical manufacturers, emergency response operations, users of certain hazardous materials, and users of petroleum products, among others. Facilities may simply be required to have a plan or may be required to submit the plan to state or federal agencies. These various plans can cover a variety of substances and processes, as well as different types of industries.

Accident Data Collection and Analysis

Specification of the hazardous materials that may be released, the amount released, who must report a release, when it must be reported, and to whom reports must be made are among the primary provisions included in many statutes and regulations governing the hazardous materials safety system. Each regulatory agency charged with controlling hazardous materials has developed an accident reporting system and databases to accommodate its specific accident notification requirements and data needs. There are primary databases, i.e., EPA's Emergency Response Notification System, DOT's Hazardous Materials Information System, OSHA's Integrated Management Information System, and the Coast Guard's Marine Safety Information System. The EPA and DOT systems share a common data management system, the Volpe National Transportation Systems Center. In addition, DOE maintains its Occurrence Reporting and Processing System. Secondary databases have also been developed to address specific information and study purposes, for example, the Acute Hazards Events database or the Accidental Release Information Program, developed by EPA to examine specific data for a specific period of time.

IDENTIFIED PROBLEM AREAS

In looking at the hazardous materials safety system, this report identified a number of problems which impact negatively on the overall system. These problems fall predominantly into two categories: 1) those stemming from the statutory and regulatory structure; and 2) those that arise from a lack of effective coordination. The following is a brief discussion of these sets of problems, as well as identification of where further study is warranted, and the Executive Branch actions that have been taken.

STATUTORY AND REGULATORY PROBLEM AREAS

Statutory Definitions. At least nine laws with different terms and definitions for regulated substances or reportable events are administered by the regulatory bodies. These laws differ in the terminology used to define the hazards addressed, i.e., hazardous substance, hazardous material, pollutant, etc., the regulated community, and the reportable event (i.e., spill, release, accident, incident). Because these laws and regulations were enacted independently of one another, and often contain multiple purposes, including hazardous materials safety provisions, the definitions are often confusing for the regulated community, as well as the regulators. Further, many of the current different terms and definitions for hazardous materials address long-term environmental problems, in addition to the provisions for emergency situations, complicating the issue.

Multiple terms and definitions appear to confuse the regulated community about when reporting for emergency events is necessary and confuse responders about what materials are harmful in such events. Development of more uniform terminology for regulated substances and reportable events is necessary to eliminate such confusion. The impacts of selecting more uniform terminology should be studied, particularly as they affect the regulated communities and the existing regulatory structure. Such consideration should include the impacts on data collection, management and analysis. After further study, statutory changes may be recommended.

Multiple Hazard Classification Systems. Based on Congressional mandates, each of the regulatory agencies —DOT, EPA, OSHA —has different systems for identifying, classifying and listing hazards. These hazard classification systems, including the various chemical lists, form the basis for safety programs because they currently control what facilities and companies are regulated, what regulations must be complied with, who has to report for prevention, planning or accident notification and investigation purposes, and what must be reported to the federal, state, and local governments. In addition, existing hazard classification systems control such specific safety functions as prevention, clean-up, liability, and notification for preparedness, planning, and response. Numerous regulatory lists of chemicals have been established, seven of which directly relate to accident prevention, preparedness, and response. Most lists are required by statute. The statutes from which hazard classification systems, including mandated lists, are derived include: Clean Air Act, Emergency Planning and Community Right-to-Know Act, Comprehensive Environmental Response and Compensation Liability Act, Resource Conservation and Recovery Act, Federal Water Pollution Control Act, Occupational Safety and Health Act, Hazardous Materials Transportation Act.

Among the factors contributing to problems in developing hazard classification systems are: (1) the statutory purposes and listed substances are not always consistent; (2) the statute and regulations serve more than one purpose, each of which may require different lists; (3) statutes that specifically list chemicals reduce flexibility in list management; (4) explicit risk-based criteria and supporting data for listing substances are not always defined; and (5) overlaps, gaps in coverage, and technical data problems result from current lists. Specifically in terms of gaps, long-term health and ecological effects from chemical accidents are unknown. Developing criteria which take such effects into consideration is difficult because of the nature of the scientific data available and the relative scarcity of study events. Ecological effects are insufficiently considered in the criteria for evaluating accidents. Most chemicals are controlled based on their potential impacts on human health or safety. It has been presumed that protecting human health will protect

environmental health. However, this has not necessarily proven to be correct. Further complicating the hazard classification problem is the lack of standard chemical nomenclature for purposes of chemical identification. The lack of consistency in hazard classification systems among regulatory agencies may deter the United States' ability to move toward international harmonization, and may affect future competitiveness of U.S. chemical companies abroad.

Harmonizing the existing regulatory agencies' different classification systems into a primarily criteria-based system requires that each agency regulating the same materials uses common identifiers, definitions, and universe of criteria. A process to accomplish such harmonization is a necessary and important step toward improving the hazardous materials safety system. Rationalizing the domestic hazard classification system to facilitate international harmonization, such as DOT has done, should be an intended and achievable goal. Since many chemical lists included in various agencies' domestic hazard classification systems are currently mandated, statutory changes will ultimately be necessary. Development of an internationally uniform hazard classification system presents considerable challenges because it entails both domestic harmonization as well as the coordination of multiple international organizations, interests, and other hazard classification systems.[7] Additional analysis and coordination is needed to consider and develop a long term plan for domestic harmonization, in keeping with the goal of international harmonization. Developing such a plan will necessitate identification of the statutes which may need to be revised to ultimately achieve such goals.

Facility Contingency Plan Consolidation. Federal statutes and regulations require different constituents of the regulated community to prepare contingency plans. Because these statutes and regulations were enacted independently of one another, inconsistent components have resulted in the regulatory process. Some planning requirements are more stringent than others; some require specific technical features; and some require submission of the contingency plans for federal or state and local review. Also, because different statutes identify different, though often similar hazards, the number and type of facilities required to develop these plans varies. There is seldom harmony in the required formats or elements of particular plans. Consideration should be given to examining the different federal requirements for facility contingency planning to determine the desirability of a federal baseline standard to which additional, and necessary component features could be added in order to address the safety concerns of a particular constituency. Such action will necessitate a more detailed analysis of the reasons for and criteria governing the multiple regulations currently in place prior to any changes in statutory or regulatory provisions.

COORDINATION PROBLEM AREAS

Coordination of Hazardous Materials Prevention Programs. The number of different statutes designed to control and regulate hazardous materials has created problems for the regulated community and the regulators alike. Confusion, redundancy, overlaps, inefficiencies, and in some cases gaps in responsibility

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[7] Harmonization of hazard classification systems for international transportation has been ongoing since 1953 through the United Nations Committee of Experts on Transport of Dangerous Goods. DOT/RSPA provides U.S. representation on the U.N. Committee and serves as the principal U.S. delegate. Also, more recently, under the auspices of the State Department, a U.S. interagency group, along with other representatives from the Organization for Economic Cooperation and Development (OECD) has been established to determine if and how international harmonization of at least one set of criteria, i.e. acute toxicity, will be possible. The OECD will be expanding its efforts in the area of harmonizing chemical classification to cover various classes of materials. In conjunction with the harmonization efforts, the International Labor Organization, World Health Organization, Commission of European Communities, United Nations Environment Program and International Program on Chemical Safety have all been actively involved.

have resulted from the proliferation of laws and regulations guiding the existing safety system. Specifically, problems exist in terminology; contradictions occur in regulations because different statutes and regulations address many of the same universe of materials; and, gaps and inconsistencies exist in technical data, and in some of the criteria used for classifying hazards, i.e., long term health and ecological impacts. Some statutes require coordination. In many instances, agencies themselves develop Memoranda of Understanding to define specific responsibilities and avoid overlap or regulatory conflict. However, in many cases, regulations, developed independently, result in unintended, negative impacts on other regulators and the regulated community. While agencies can participate in regulatory development through public comment, early discussions and information-sharing among agencies about prevention matters may stem some of the problems inherent in the existing system.

As a result of the work of the National Response Team on this report and a report on Federal Government Control of Hazardous Materials, the NRT has established a Prevention Committee to foster a dialogue among its members on matters regarding development and promulgation of hazardous materials and oil spills prevention programs at the federal level. The objectives of this Committee are to: 1) provide and facilitate communication and information exchange regarding prevention activities; 2) maintain awareness of interagency federal hazardous materials and oil spill prevention activities; and 3) promote the coordination of prevention activities among the federal agencies, in particular those of inter-agency interest.

Coordination of Contingency Planning Across Federal, State and Local Government Agencies. The potential consequences to public safety and the environment of a severe hazardous materials accident and the complexity of the existing contingency planning system necessitate close and continued coordination across agencies and among all levels of government. Planning across federal, state, and local government agencies includes: the NCP, FRERP, FRP, OPA Area Contingency Plans, EPCRA Contingency Plans, and "All Hazards" Emergency Operations Plans. The absence of a consistent and sustained strategy for coordinating plans and communication among federal, state and local contingency planning and response groups, could well result in confusion, delays, and problems among responsible parties if any major accident were to occur. While no serious hazardous materials events resulted from the recent Hurricane Andrew, among the lessons learned cited in previous hazardous materials accident reports (Exxon Valdez for example) has been the need for improved coordination among federal, state and local groups. Adding new plans and planning bodies to the existing complex system has been the approach taken to address coordination issues resulting from previous events or circumstances. However, a solid strategy, based on human interaction among planning and response groups, in addition to exchanging written documents, is a necessity, which laws alone cannot achieve.

To address this concern within the Executive Branch, the National Response Team will develop a consistent strategy for coordination among federal, state, and local planning and response groups. Such a strategy will focus on ways to bring such groups together to discuss common problems, and review and explore approaches to planning and response. As a part of this effort the NRT, working through the RRTs and Area Committees will develop a strategy for establishing appropriate liaisons with the governors of each state, mayors, and other chief executives of local government. The focus of Area Committees is to strengthen relationships, as well as planning among federal, state, and local response agencies.

Accident Data Management and Analysis. Regulations regarding accident notification and reporting are different based on different statutes and the hazardous materials specified by those statutes. As a result, multiple notifications are required and multiple accident databases have been developed by the various regulatory agencies to monitor emergencies, and/or to record and track accident information. While the reasons for the variety of different databases operated by the regulatory agencies are in most instances valid, the absence of comparable data sets and the lack of database coordination among agencies inhibits comparative analysis and cross agency use of accident data. Consolidation of existing databases used by each agency or department is probably not realistically feasible, nor preferable. However, other steps should be

taken to make existing data more usable, available and comparable, and to make database management more efficient and effective.

Streamlining the accident notification reporting requirements, the accident databases, and data elements within the databases to eliminate databases and elements that are not useful or used extensively needs to be further examined. When streamlining databases, incorporating comparable elements and terms to improve accessibility, comparability, and keywording of the information collected will be necessary. In order to improve interagency collection of accident data and database management an appropriate forum within the Executive Branch should be identified during the next phase of activity.

CONCLUSION

To ensure coordination and effective and efficient implementation of the release prevention, mitigation and response authorities of various federal agencies, the National Response Team is continuing to improve its coordinating efforts. As a result of this report and the report on Federal Control of Hazardous Materials, the NRT has established a Prevention Committee and is continuing to develop strategies to effectively coordinate contingency planning across all levels of government. However, the complexity of the current hazardous materials safety system, the confusion and overlap in programs, regulations and laws, and the structure for administering such programs warrant change. Based on analysis conducted for this review, statutory changes may be required to achieve improvements needed in the existing hazardous materials safety system. However, statutory changes are not appropriate at this time because additional stakeholder participation is needed to establish options and consensus for change and to further refine or validate the conclusions of this report.

The problems identified by this review indicate that a second phase of analysis should be undertaken that includes consideration of these issues by federal, state, and local government, fire service, labor, industry, environmental, and other public interest groups. The Congress should be consulted. The purpose of this second phase is to further address the systemic issues raised by this report. The success or failure of this phase will be determined by the extent to which it addresses the needs and problems of the local planning and response bodies and of the regulated community.

This second phase would:

- Identify and develop the technical options and changes necessary in each of the issues outlined;
- If necessary, propose specific regulatory and/or statutory changes, including statutory language, for the issues defined above; and
- Develop detailed strategies for streamlining and consolidating accident prevention, preparedness and response functions within the Executive Branch in those areas cited by this report.

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Acronym List

ACGIH	American Conference of Governmental Industrial Hygienists
ACPs	Area Contingency Plans
AEA	Atomic Energy Act
AEC	Atomic Energy Commission
AHE	Acute Hazard Events
ANPRM	Advance Notice of Proposed Rulemaking
AP	Associated Press
ARIP	Accidental Release Information Program
ATF	Bureau of Alcohol, Tobacco, and Firearms
ATSDR	Agency for Toxic Substances and Disease Registry
BMCS	Office of Motor Carriers (formerly Bureau of Motor Carrier Safety)
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CAB	Civil Aeronautics Board
CAMEO™	Computer Aided Management of Emergency Operations
CAS	Chemical Abstract Service
CCA	Comprehensive Cooperative Agreements
CDC	Centers for Disease Control, Department of Health and Human Services
CDRG	Catastrophic Disaster Response Group
CEPPO	Chemical Emergency Preparedness and Prevention Office, Environmental Protection Agency
CFR	Code of Federal Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COTP	Captain of the Port
CSEPP	Chemical Stockpile Emergency Preparedness Program
CSHIB	Chemical Safety and Hazard Investigation Board
CWA	Clean Water Act
DNA	Defense Nuclear Agency
DNFSB	Defense Nuclear Facilities Safety Board
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of Interior
DOJ	Department of Justice
DOL	Department of Labor
DOS	Department of State
DOT	Department of Transportation
EHS	Extremely Hazardous Substances
EMS	Emergency Management System
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERAMS	Environmental Radiation Ambient Monitoring System
ERDA	Energy Research and Development Agency
ERNS	Emergency Response Notification System
ERPGs	Emergency Response Planning Guidelines
ERT	Environmental Response Team
ESF	Emergency Support Function
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FRA	Federal Railroad Administration
FRERP	Federal Radiological Emergency Response Plan
FRP	Federal Response Plan
FRPCC	Federal Radiological Preparedness Coordinating Committee
FWPCA	Federal Water Pollution Control Act
FWS	Fish and Wildlife Service, Department of Interior
GSA	General Services Administration

HAZWOPER	Hazardous Waste Operations and Emergency Response
HCS	Hazard Communication Standard
HEW	Department of Health, Education, and Welfare
HHS	Department of Health and Human Services
HLPSA	Hazardous Liquid Pipeline Act of 1979
HMIS	Hazardous Materials Information System
HMTA	Hazardous Materials Transportation Act
HMTUSA	Hazardous Materials Transportation Uniform Safety Act
HSEES	Hazardous Substances Emergency Event Surveillance Database
HUD	Department of Housing and Urban Development
ICC	Interstate Commerce Commission
IDLH	Immediately Dangerous to Life and Health
IMIS	Integrated Management Information System
IRIS	Incident Reporting Information System
LEPC	Local Emergency Planning Committee
LOC	Level of Concern
LUST	Leaking Underground Storage Tank
MSDS	Material Safety Data Sheets
MSIS	Marine Safety Information System
MSN	Marine Safety Network
MTB	Department of Transportation's Materials Transportation Board
NASA	National Aeronautical and Space Administration
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFIRS	National Fire Incident Reporting System/FEMA
NFPA	National Fire Protection Agency
NGPSA	Natural Gas Pipeline Safety Act of 1968
NICT	National Incident Coordination Team
NIEHS	National Institutes of Environmental Health Sciences
NIOSH	National Institute for Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPRM	Notice of Proposed Rule Making
NPS	National Park Service
NRC	National Response Center
NRC	Nuclear Regulatory Commission
NRT	National Response Team
NTSB	National Transportation Safety Board
NVIC	Navigation and Vessel Inspection Circular
NWPA	Nuclear Waste Policy Act
OEA	Office of Environmental Affairs
OERR	Office of Emergency and Remedial Response, Environmental Protection Agency
OMB	Office of Management and Budget
OPA	Oil Pollution Act
ORD	Office of Research and Development
ORPS	Occurrence Reporting and Processing System
OSC	On-Scene Coordinator
OSH Act	Occupational Safety and Health Act
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
PAWMIS	Ports and Waterways Management Information System
PCB	Polychlorinated biphenyl
PELs	Permissible Exposure Limits
PPA	Pollution Prevention Act
PSM	Process Safety Management
PTSA	Ports and Tanker Safety Act

RCPs	Regional Contingency Plans
RCRA	Resources Conservation and Recovery Act
REP	Radiological Emergency Preparedness
RPMs	Remedial Project Managers
RRT	Regional Response Team
RSPA	Research and Special Programs Administration, Department of Transportation
RQ	Reportable Quantity
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SERC	State Emergency Response Commission
SPCC	Spill Prevention Control and Countermeasures
SUPERFUND	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, and Disposal
UPI	United Press International
USC	United States Code
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USN	United States Navy
UST	Underground Storage Tanks

PURPOSE

PRESIDENTIAL REVIEW. The President shall conduct a review of release prevention, mitigation and response authorities of the various federal agencies and shall clarify and coordinate agency responsibilities to assure the most effective and efficient implementation of such authorities and to identify any deficiencies in authority or resources which may exist. The President may utilize the resources and solicit the recommendations of the Chemical Safety and Hazard Investigation Board in conducting such review. At the conclusion of such review, but not later than 24 months after the date of enactment of the Clean Air Act Amendments of 1990, the President shall transmit a message to the Congress on the release prevention, mitigation and response activities of the federal government making such recommendations for change in law as the President may deem appropriate. Nothing in this paragraph shall be interpreted, construed or applied to authorize the President to modify or reassign release prevention, mitigation or response authorities otherwise established by law.

Clean Air Act, as amended, 1990
Section 112(r)(10)

INTRODUCTION

This report serves both to describe the existing system for the hazardous material release prevention, mitigation and response, and to provide findings with respect to key policy questions and issues. In order to address the full range of federal authorities, EPA, with the assistance of the National Response Team [1], adopted the following assumptions for the scope of the report.

- "Accident" or emergency release authorities and issues are the focus of this review. Superfund remedial programs are not addressed. Routine, or permitted, release authorities are not discussed, except to the extent that these authorities also provide for accident prevention, mitigation and response.
- "Response" is defined as the immediate short-term actions generally taken in the initial hours or days following a release to mitigate, stop, or reverse the effects of a release.
- "Emergency" refers to an incident that, without response, has the potential for severe, short-term adverse effects on human health or the environment.
- Preparedness is included on an equal basis with prevention and response, and mitigation is treated as an integral part of prevention, preparedness, and response.
- Both stationary (fixed facility) and transportation sources for releases are examined.
- All environmental media (air, water, ground, etc.) are included in this review.
- The term "hazardous materials" is used generically (as opposed to its specific statutory/regulatory definition) to include all hazardous chemicals, hazardous substances, toxic substances, pollutants, contaminants, and hazardous wastes and materials, including oil and radioactive materials.

Frequently throughout this report the term "hazardous materials safety system" is used. As defined, "hazardous materials safety system" is the composite of those federal, state, and local statutes, regulations, and programs designed to address hazardous materials accident prevention, preparedness, and response. While components of the system have not in all cases been created with consideration for one another, each functions in specific ways to address hazardous materials safety. A central function of this report is to examine whether the existing system today is effective for the purposes it is designed to serve.

The report structure acknowledges the large-scale, complex and inter-connected nature of activities undertaken across federal, state, and local governments to prevent, prepare for, and respond to accidental releases of hazardous materials. After providing an overview and examining the incidence of such events, the report describes statutes, regulations, and government programs which evolved in response to these concerns.

In reviewing the accident data and existing federal authorities for accident prevention, preparedness, and response, the report poses a series of fundamental questions:

- What is the accident problem?
- Are existing laws, regulations, and programs responding to the problem efficiently and effectively?
- What kinds of improvements are needed?
- What steps should be investigated to improve operation of the system?

This review is intended as a starting point for answering these questions — reviewing the systems, offering perspective, and suggesting directions that merit further attention. This review is an issue-oriented

document. The federal system for protecting the public, workers, and the environment from the threats of hazardous materials is well established and, for the most part, accomplishes statutory goals. However, for the reasons described in the report, several of its limitations consistently have been raised as "issues" prior to and during the interagency review process undertaken to develop this report.

Certain subject areas identified by the federal agencies participating in the development of the report received particular focus, and the report's structure reflects this attention. Chapter 1 examines various aspects of the hazardous materials safety record and the databases used to manage accident data. Chapter 2 explores the historical context for policy development in hazardous materials accident prevention, preparedness and response. Chapter 3 discusses our current government framework. Chapter 4 focuses on the system for establishing hazard classifications and chemical lists. It examines the problems for both the regulators and the regulated community in tracking chemicals classes, chemicals, and chemical lists. Chapter 5 examines the multiple contingency planning requirements and the complexity of organizational systems intended to carry out planning; and Chapter 6 reviews how the emergency response system is intended to function. Chapter 7 is the conclusion.

The challenge in managing a successful system or set of systems for accident prevention, preparedness, and response is to reduce public risks as efficiently and cost-effectively as possible. The report identifies areas of the existing structure which could be streamlined.

CHAPTER 1. THE HAZARDOUS MATERIALS ACCIDENT PICTURE IN THE UNITED STATES

INTRODUCTION

Today, the lifestyles of citizens are affected by the creation, production, transportation, use, and disposal of chemicals, oil and petroleum based products, and radioactive materials. During the past century, these materials and products have radically changed the clothes we wear, the food we eat, the homes we build, the places we work, and the activities we undertake -- touching every part of the existence of the modern American. Just as these materials have brought benefits to the modern age, near-term and long-term environmental risks and health hazards are also a part of their legacy.

This chapter addresses what is known about hazardous materials accidents: the frequency, severity, and types of hazardous materials involved in emergencies, and the existing system for reporting and tracking such emergencies. The chapter describes the "life cycle" of hazardous materials to illustrate the scope and complexity of the regulated community. It generally defines those "hazardous materials" addressed in the discussion of accidents. The information presented in the following discussions gives a general indication of the magnitude of the accident problem, where those accidents occur, and what they cost in terms of lives and resources. It also identifies those areas where knowledge about safety is limited. The information presented on the accident picture provides an overview of different aspects of the safety problem, rather than an in-depth study. Examination of the available hazardous materials accident record is key in determining whether the safety policies that have been implemented, and the resources used for those policies, are directed effectively at the appropriate problems. The existing system for accident reporting and management of accident information is driven by a variety of statutes and regulations. Various laws require different materials and amounts to be reported to one or many different notification points, at the local, state, or federal levels. After analysis of the accident picture, this chapter examines accident reporting requirements and federal government use and management of various accident databases.

Scope of the Accident Picture Discussion

As previously indicated, this review uses the term **"hazardous materials"** generally to include: chemicals, oil and petroleum based products, and radioactive materials.

The term **accident**, as used in this report, is intended to describe a variety of emergency events, whether intentional or not, which may necessitate some form of public safety response. Different federal agencies use different terms and definitions, such as incident, release, spill, etc., which are treated generically within the term "accident."

Oil and petroleum based products were among the first hazardous materials to be produced and used widely. The analysis of the accident data, included in the following sections, examines oil and petroleum related accidents as one component of the accident picture for hazardous materials.

Chemicals and allied products are used in all industrial and agricultural areas of the economy, with products developed for such major sectors as transportation, electronics, construction, textiles, other durable goods and consumer related products. More than 50,000 different chemical compounds, composites, and alloys are currently produced in the U.S. and account for nearly 30% of the world chemical markets. Domestic chemical industry activity now serves as a leading economic indicator for the U.S. economy and contributes substantially to the health of our international balance of trade. Accident information involving chemical and allied products is discussed in the following sections.

Accidents or incidents involving hazardous materials occur at both fixed facilities and during transportation. This analysis reviews existing **fixed facility** accident information and incidents involving

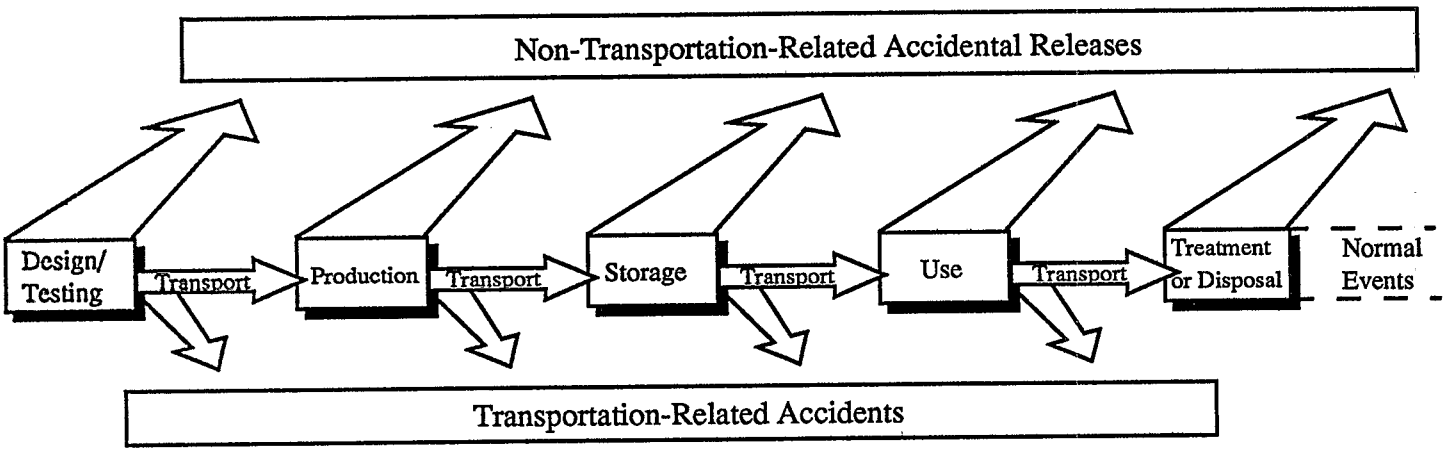
transportation of hazardous materials which may occur at any point during the life cycle of such materials and by any one of the four transportation modes, i.e., air, truck, rail and water.

Another important distinction in the review of the safety record is the extent to which accidents result in casualties to workers, responders, and public citizens. As such, distinctions in who is or has been most seriously impacted by casualties resulting from hazardous materials accidents are also discussed. Property damage estimates provide the only available information on damage incurred in accidents.

The Life Cycle of a Hazardous Material

Safety policies must be developed with the understanding that accidents can and will occur anywhere and at any time during the creation, production, transportation, use, recycling, treatment and disposal of those materials. This fact makes the development of cohesive policies for hazardous materials safety difficult. Figure 1-1 displays the different phases in the life cycle of a hazardous material.

Figure 1-1: Flowchart of Events During the "Life" of a Hazardous Material



NORMAL EVENTS:

Design/Testing: Initial, small-volume design and testing of the material

Production: Commercial production of the material

Storage: Storage at any point during the life of the material

Use: Use of the material (either directly or as part of a process)

Treatment: Partially or completely rendering harmless or destroying hazardous material
Disposal: Landfill, emission, or other type of discharge of the material

Transport: Transportation at any stage during the life of the material

ACCIDENTAL RELEASES: Unintentional releases that can occur at any stage of the "normal" process. As indicated, these can be transportation-related or non-transportation related.

THE ACCIDENT PICTURE

Accident data are intended to support a variety of public policy goals, including accident notification, inspection, enforcement, policy analysis, and emergency planning. Data and information for purposes of this review have been taken from different databases including initial accident reports, investigations at the accident scene, follow-up inquiries, and special studies. A great deal of the available data reviewed in this report is from notification information for both fixed facility and transportation incidents involving hazardous materials received at the federal government's primary accident notification center, the National Response Center, and by EPA regions and district offices of the U.S. Coast Guard.

While the number of these incident notifications is large, the data do not reflect the actual number of incidents occurring because many accidents are not reported to the federal government. Also, the number of these notifications do not necessarily reflect the number of accidents requiring response because many of these notifications result from federal requirements for other than accident or emergency purposes. With the exception of reports on incidents involving the transportation of CERCLA hazardous substances, hazardous wastes, and flammable cryogenic liquids, only carriers and shippers involved in interstate transportation are required to report incidents. Thus the total number of transportation incidents is also understated. In addition, incidents involving hazardous materials releases for transportation or fixed facilities below "reportable quantities" are not required to be reported. Further, follow-up to verify information obtained in the initial notifications is not undertaken, and many releases are not investigated because rules were not violated or injuries did not occur.

While various federal agencies and private sector organizations have undertaken analyses of accident data in a variety of studies, comparability of these studies and data, as well as understanding of the severity and consequences of accidents from available information, is difficult to ascertain.

The different sets of information presented should be read as individual vignettes describing some aspect of the accident picture. The sections cannot be compared because different data sets are used, and should not be viewed as a complete picture. Data contained in most databases have not been verified, and require understanding of the database assumptions and limitations. Any findings regarding the accident picture must be examined in light of the database limitations. A comprehensive analysis of the accident problem is an important area for subsequent research, if further efforts to streamline and improve the safety system are warranted.

Incident Frequency Picture

Incidents involving the release of hazardous materials at fixed facilities and during transportation occur every day. According to notifications made to the National Response Center, in 1991 there were approximately 35,600 release notifications. Figure 1-2 shows that over 19,000 calls represented reported releases of oil or petroleum based products, over 5,800 calls indicated a release of a hazardous material, or hazardous substance as defined in the regulations by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and over 10,500 represented calls about releases or potential releases of hazardous materials other than CERCLA listed materials, or oil and petroleum based products.

As previously indicated, a number of hazardous material releases are not required to be reported to the federal government. While numerous notifications are made to the federal government each year, various analyses of accident databases have shown discrepancies in the numbers of fixed facility and transportation accident notifications made to the federal government. These discrepancies show up in various federal agency databases, as well as when compared to accidents reported at the local and state levels. In fact, local governments respond to many more accidents and incidents than are reflected in the federal database. Under-reporting has been documented by several studies conducted in the mid-1980's, and more recently.

Figure 1-2: 1991 Release Notifications of Oil and CERCLA substances from Fixed Facilities and During Transport[1]

Chemical	Number of Notifications	Percent of Total Notifications
Oil	19,264	54
CERCLA substances	5,885	16
Other substances	10,504	30
All substances	35,653	100

The number of reported releases of hazardous substances from fixed facilities and during transportation seems to be increasing according to notifications listed in EPA's Emergency Response Notification System (ERNS), shown in Figures 1-3 and 1-4. Reasons for this inncrease may include growth in number of chemical shipments of small package carriers, outreach efforts to encourage better reporting, or newer laws such as EPCRA which mandated additional reporting, as well as increased the scope of releases which could be reported.

Hazardous Materials Most Frequently Involved in Incidents

Based on information derived from several different databases, some approximation of the hazardous materials most frequently reported can be obtained. The following information describes those hazardous materials, oil and petroleum based products most frequently released at fixed facilities and during transport.

[1] Figures reported to the National Response Center and drawn from ERNS database for 1991.

Figure 1–3
ERNS Notifications Received Annually

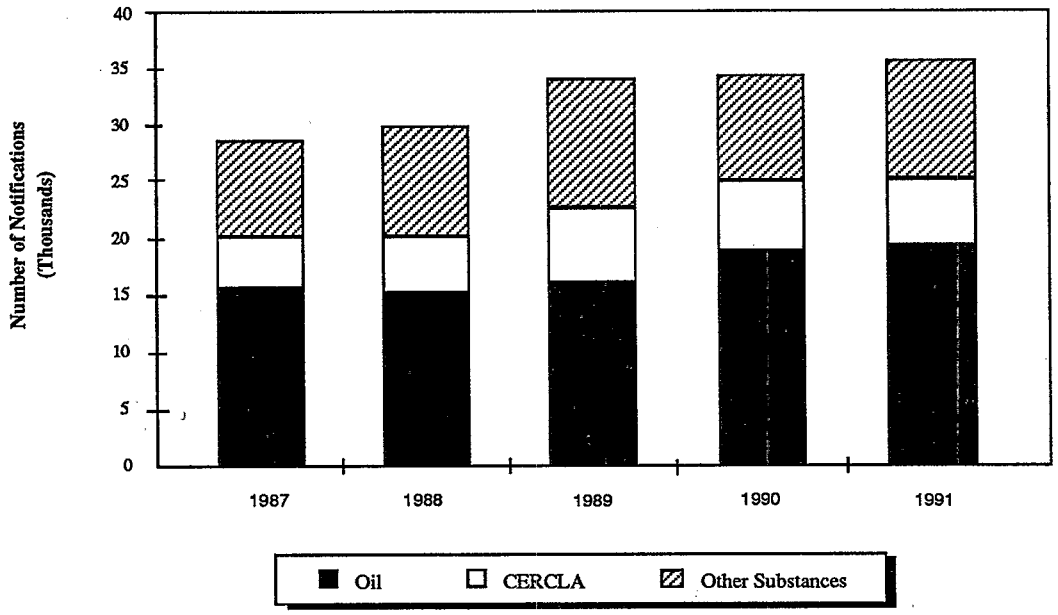
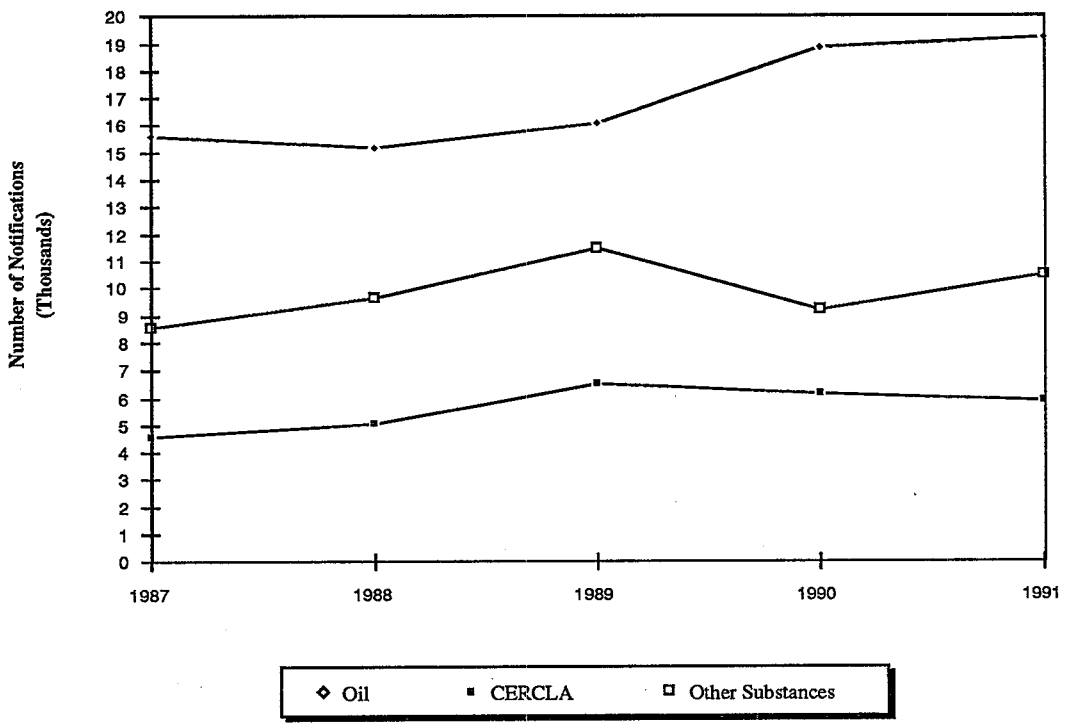


Figure 1–4
ERNS Notifications Received Annually



Hazardous Materials Frequently Involved in Incidents at Fixed Facilities. Those chemicals most frequently released at fixed facilities, as indicated in 1990 ERNS data, are shown in Figure 1-5.[2]

Figure 1-5: Top Ten CERCLA Chemicals Released from Fixed Facilities in 1990

CERCLA Notifications	
Chemical Name	**# of Notifications**
Polychlorinated Biphenyls (PCB)	691
Anhydrous Ammonia	493
Sulfuric Acid	333
Chlorine	312
Chloroform	300
Benzene	221
Hydrogen Sulfide	184
Hydrochloric Acid	156
Vinyl Chloride	135
Sodium Hydroxide	101

Total Number of Releases from a Fixed Facility: 15,388

NOTE: This information is based on initial notification data and may be subject to verification. This search was performed on October 21, 1992 and reflects data as of this date.

There are other chemicals which are not listed under CERCLA and which therefore may not be required to be reported to the federal government, but which may be frequently released. Some, though not all, of these releases involving such chemicals are reported to the federal government. Figure 1-6 lists those additional chemicals released by fixed facilities that are reported most frequently to the federal government, irrespective of federal reporting requirements.

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[2] Different statutes list, or require to be listed, different chemicals. These chemical lists serve a variety of purposes including determining what industries are regulated, what must be reported in the event of an accident and when such reports must be made. The CERCLA list of hazardous substances contains some 725 specific hazardous substances which, when released from a vessel or facility by accident above a reportable quantity in a 24 hour period, must be reported immediately to the National Response Center when the person in charge of the facility has knowledge thereof.

Figure 1-6: Top Ten Non-CERCLA Chemicals Released From Fixed Facilities in 1990

Non-CERCLA Notifications	
Chemical Name	**# of Notifications**
Sulfur Dioxide	248
Ethylene Glycol[3]	53
Dimethyl Sulfide	24
Propane	23
n-Hexane	14
Bromine	14
Titanium Tetrachloride	13
Ethylene	11
Hydrogen Peroxide	8
Isopropyl Alcohol	8

As shown in Figure 1-7, the top five most frequently released oil products for fixed facilities are involved in 60 percent of the oil release incidents reported to the National Response Center and contained in the ERNS database.

Figure 1-7: Top Five Oil Products Most Frequently Reported from Fixed Facilities in 1990

Oil Product	Number of Notifications	Percent of Total Notifications from Fixed Facilities
Crude Oil	1,537	24
Diesel Fuel	655	10
Gasoline	930	15
Waste Oil	107	2
Heating Oil	541	9
Other Oil Products	2,525	40
Total	6,295	100

[2] Figures from ERNS database for 1990.

[3] As a result of the passage of the Clean Air Act Amendments of 1990 and the CERCLA section 101(14) definition of hazardous substance, ethylene glycol became a hazardous substance with a reportable quantity of one pound on November 15, 1990.

Hazardous Materials Most Frequently Involved in Transportation Incidents. During transportation from the period 1987-1991, the top fifty hazardous materials most frequently involved in incidents are shown in Appendix 1-A. According to this data, 29, or 58 percent, of those materials listed were either classified as flammable-combustible liquids or combustible liquids. Figure 1-8 shows the top ten hazardous materials most frequently involved in transportation incidents during the five year time period.

Figure 1-8: Top 10 Hazardous Materials Most Frequently Involved in Transportation Incidents

RANK	COMMODITY NAME	HAZARD CLASS	INCIDENTS
1	Corrosive Liquids N.O.S.	Corrosive Material	2383
2	Flammable Liquids N.O.S.	Flammable - Combustible Liquid	2076
3	Compound Cleaning Liquid	Corrosive Material	1947
4	Gasoline	Flammable - Combustible Liquid	1880
5	Hydrochloric Acid Solution	Corrosive Material	1634
6	Sulfuric Acid	Corrosive Material	1546
7	Fuel Oil No. 1,2,4,5,6	Corrosive Liquid	1313
8	Resin Solution	Flammable - Combustible Liquid	1305
9	Paint or Paint Related	Flammable - Combustible Liquid	1101
10	Sodium Hydroxide Solution	Corrosive Material	1087

Hazardous Materials Accident Casualties

While numerous incidents are responded to annually, the vast majority do not involve fatalities, injuries, nor mass evacuations. The following discussion focuses on those casualties which result from transportation and workplace accidents involving hazardous materials.

Worker Casualties resulting from a Hazardous Materials Release. Both federal and state-run occupational safety and health programs conduct investigations of accidents at fixed facilities that result in a fatality or the hospitalization of five or more employees. During the five-year period from January 1987 to December 1991, OSHA conducted investigations of 467 chemically-related accidents, which resulted in 453 worker fatalities and 1,566 worker injuries, 877 of which required hospitalization, as shown in Figure 1-9.

According to OSHA research developed for this report, of those 467 accident investigations for fixed facilities, 68 percent (316) resulted in at least one worker fatality. Further, of the hazardous materials accidents involving workplace casualties, those materials most often contributing to the casualty picture are displayed in Figure 1-10.

Hazardous Materials Casualties during Transportation Accidents. Transportation casualties in which hazardous materials were involved, and those chemicals most frequently involved in transportation accidents in which there was a casualty, represent a second aspect of the casualty picture for hazardous materials incidents. According to DOT information, less than three percent of the total hazardous

Figure 1-9: Federal and State OSHA Investigation With Hazardous Substance-Related Injuries and Fatalities January 1987 - December 1991

BY YEAR	# OF ACCIDENT INVESTIGATIONS	# OF FATALITIES	# OF INJURED HOSPITALIZED		# OF INJURED NON-HOSPITALIZED		TOTAL # OF INJURED	TOTAL # OF FATALITIES & INJURED
1987*	100	82	190	+	103	=	293	375
1988*	110	101	159	+	79	=	238	339
1989*	99	114	215	+	200	=	415	529
1990	81	87	122	+	139	=	261	348
1991	77	69	191	+	168	=	359	428
Total	**467**	**453**	**877**	+	**689**	=	**1566**	**2019**
Average	**93**	**91**	**175**	+	**138**	=	**313**	**404**

* Data are incomplete for this earlier period when some states were not reporting accident investigation data to the Federal OSHA IMIS. Data collected for this chart is based on reports where there was a fatality, or five or more persons hospitalized.

Figure 1-10: Chemicals Involved in OSHA Incidents 1987-1991
(* = Top Ten in Each Directory)

CHEMICAL		# OF ACCIDENTS	# OF FATALITIES	# OF INJURIES
Carbon Monoxide	(CMO)	70*	48*	276*
Gasoline	(GAT)	30*	32*	38*
Hydrogen Sulfide	(HDS)	26*	36*	39*
Methane	(MTH)	25*	33*	72*
Nitrogen	(NXX)	23*	30*	14
Chlorine	(CLX)	22*	2	162*
Naphtha	(NSV)	17*	19*	17
Propane	(PRP)	14*	10*	19
Ammonia	(AMA)	14*	4	68*
Sulfuric Acid	(SFA)	13*	8	81*
Methylene Chloride	(MTC)	13	15*	4
Toluene	(TOL)	12	18*	71*
Carbon Dioxide	(CDO)	12	9	85*
Methyl Chloroform	(MTC)	8	7	8
LPG	(LPG)	8	8	3
Nitrous Oxide	(NTO)	8	14*	1
Xylene	(XLM)	7	6	34*
Asbestos		6	6	0
Sodium Hydroxide	(SHD)	6	2	14
Hydrogen Fluoride	(HFX)	6	2	27
Argon		3	3	0
Benzene	(BNZ)	5	4	13
Hydrogen Chloride	(HDC)	5	3	14
Acetic Acid	(AAC)	3	1	12
Butane	(BUT)	4	5	3
Isopropyl Alcohol		4	0	12
Trichloroethane		3	6	1
Acetylene		3	3	1
Sulfur Dioxide		3	0	10
Oil Mist		3	4	0
ARCO Chemical Explosion		1	17	-
Ethylene, Isobutane, Etc. - Phillips		1	24	132
IMC Compressor Explosion/Fire		1	8	128
20 Chemicals -- 2 Times		40	35	92
48 Chemicals -- 1 Time		48	31	115
TOTALS		**467**	**453**	**1566**
Percentage Totals of (*)		**54%**	**56%**	**59%**

These data are verified to the extent possible that the casualty was attributable to hazardous materials involvement.

material releases during transportation in the last five years involved a death or injury. From 1987 through 1991, 55 people were killed and 1252 injured from accidents involving a hazardous materials release during transportation. All of the fatalities reported during the five-year period occurred in one transportation mode, i.e. vehicular accidents. Flammable-combustible liquid, flammable gas, and combustible liquids accounted for 50, or 91 percent of the fatalities, and 367, or 29 percent of the injuries. 555 or 69 percent of the injuries resulted from transportation accidents involving corrosive materials. Of the information reported to the Department of Transportation, no fatalities or injuries occurred as a result of releases of radioactive materials or etiological agents.

Figures 1-11 and 1-12 show the casualty picture for transportation incidents and the hazardous materials most frequently involved. Appendix 1-B lists the top fifty chemicals causing injury during transportation incidents involving hazardous materials. As previously indicated, these figures do not include most transportation casualties from hazardous materials accidents which occurred during intrastate transportation. However, the casualties reported in the transportation incidents involving hazardous materials have been verified as caused by the hazardous material, rather than resulting from vehicular causes. DOT receives numerous other casualty reports. Through follow-up inquiries, determinations are made regarding whether a hazardous materials release contributed to the casualty.

Due to the limitations of the databases and the existing accident reporting systems, information on citizen casualties from hazardous materials accidents cannot be readily ascertained (i.e., persons other than transportation employees or workers handling hazardous materials).

For both fixed facility and transportation incidents involving radionuclides above a reportable quantity, reports must be made to the federal government under CERCLA authority. As indicated by their absence from the charts, the ERNS and HMIS databases suggest that accidents involving releases of radionuclides, as reported under the CERCLA hazardous substance list or DOT reporting, are neither common nor severe in the United States.

Severity

In the last five years in the United States, two accidents stand out as representing the potential for and reality of catastrophic events — the Exxon Valdez oil spill (1989) and the Phillips Refinery explosion (1990). While definitive data on damage and claims costs are not easily ascertained, estimates for Exxon Valdez clean-up have been reported to exceed $2.1 billion[4], and estimates from the Phillips explosion have been reported to exceed $700 million[5]. These U.S. experiences, fortunately, do not compare to the horror of human casualties resulting from Bhopal, India (1984) when over 2,500 people died and over 200,000 were injured. However, each accident points to the necessity for maintaining a viable hazardous materials safety system.

Compared with other types of accidents, e.g., automobile deaths at approximately 41,400[6] per year, casualties resulting from accidents involving hazardous materials are small in number. However, public perception of risks associated with hazardous materials is not based on numbers, but instead is based on their inability to control the event. Hence, public perception of risk has had a significant influence on efforts to prevent hazardous materials accidents (See chapter 2, Figure 2-3).

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[4] Prudential Securities, "A Company Report on Exxon," October 16, 1991.

[5] Marsh & McLennan, 1992, Large Property Damage Losses in the Hydrocarbon/Chemical Industries: A 30-Year Review.

[6] The actual number of motor vehicle fatalities reported by DOT for 1991 is 41,462.

Figure 1-11: U.S. Department of Transportation Hazardous Materials Safety Commodity Summary by Fatalities Rank —1987-1991

RANK	COMMODITY NAME	HAZARD CLASS	FATALITIES
1	Gasoline	Flammable - Combustible Liquid	29
2	Petroleum Gases Liquefied	Flammable Gas	9
3	Combustible Liquid N.O.S.*	Combustible Liquid	3
3	Fuel Oil No. 1,2,4,5,6	Combustible Liquid	3
5	Petroleum Crude Oil	Flammable - Combustible Liquid	2
6	Ammonia Anhydrous	Nonflammable Compressed Gas	1
6	Petroleum Crude Oil	Combustible Liquid	1
6	Fuel Aviation Turbine	Combustible Liquid	1
6	Hydrochloric Acid Solution	Corrosive Material	1
6	Hydrogen Peroxide >60%	Oxidizer	1
6	Paint or Paint Related	Flammable - Combustible Liquid	1
6	Naphtha Petroleum	Flammable - Combustible Liquid	1
6	Propellant Explosive-Unstable	Explosives, Class B	1
6	Sulfur Dioxide Liquefied	Poisonous Gas	1

Figure 1-12: Top 10 Chemicals Most Frequently Resulting in Injuries from Transport Incidents Involving Hazardous Materials —1987-1991

RANK	COMMODITY NAME	HAZARD CLASS	TOTAL INJ
1	Sulfuric Acid	Corrosive Material	115
2	Corrosive Liquids N.O.S.*	Corrosive Material	77
3	Flammable Liquids N.O.S.*	Flammable - Combustible Liquid	76
4	Hydrochloric Acid Solution	Corrosive Material	70
5	Ammonia Anhydrous	Nonflammable Compressed Gas	60
6	Sulfur Dioxide Liquefied	Poisonous Gas	60
7	Sodium Hydroxide Solution	Corrosive Material	52
8	Ethyl Mercaptan	Flammable - Combustible Liquid	51
9	Gasoline	Flammable - Combustible Liquid	48
10	Petroleum Gases Liquefied	Flammable Gas	31

* Not Otherwise Specified.

Several different studies and data sources from the public and private sector contain information on accident severity as measured by casualty data and evacuations, or by property damage resulting from hazardous materials incidents. Although the data and analyses are, in many cases, limited, they do give some indication of the potential severity of hazardous materials incidents. Following are summaries of information available on incidence severity.

Acute Hazard Events Analysis[7]. According to a 1989 analysis, conducted on the Acute Hazard Events (AHE) database by EPA, during the mid-1980's, the most severe accidents in the U.S. involving chemicals have been between 10 and 100 times less severe in their consequences than the worst in world history. Thus, the U.S. has been either quite fortunate or its safety systems are effective.

Among the accidents with reported fatalities (135 events within a five year period):

- The median number of deaths was a little less than 2.
- Ten percent of such events had six or more fatalities.
- Two percent of such events had 15 or more fatalities and the maximum number of fatalities was 21.
- In contrast, the 1947 Texas City accident resulted in 560 fatalities, and Bhopal resulted in approximately 2,500 fatalities and many thousands injured.

Among accidents with reported injuries (1,020 events within a five year period):

- The median number of injuries was approximately 3.
- Ten percent of such events had 25 or more injuries.
- Two percent of such events had 90 or more injuries.
- The maximum number of injuries was 600.
- In contrast, over 200,000 people were reported injured at Bhopal.

Among accidents with reported evacuations with numbers of evacuees reported (about 500 events):

- The median number of evacuated people was 250.
- Ten percent of such events had 2,500 or more evacuees.
- Two percent of such events had 10,000 or more evacuees.

Fire and explosion, as well as toxic hazards, are equally serious concerns for the most severe events. From an historical and world-wide perspective, fire and explosion hazards are very important as illustrated by the PEMEX fire in Mexico in 1984, LPG fire in Spain in 1974, and the Texas City fire in 1947. The toxic properties of various chemicals prompted the massive evacuation of 250,000 during the Mississauga, Canada accident in 1979 and the extreme numbers of casualties in Bhopal in 1984.

A smaller group of more severe events in the AHE database were analyzed for approximately a five year period from 1982 to 1986. Those events resulting in six or more fatalities, 25 or more injuries and evacuations of 2,500 people or more were combined into a group representing approximately 150 events. Analyses of these incidents showed:

- Ninety-seven percent involved air releases, fires or explosions.
- More than half had fire or explosion as a factor, either as a cause of the release, or as the primary event in the accident;
- About 42 percent of these events seemed to be primarily air releases of toxic materials, with no fire or explosion.

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[7] AHE data are compiled from 10,933 events over 5 years.

For the limited number of the most extreme events, that is the approximately 30 which had 15 or more fatalities, or 90 or more injuries, the analyses showed:

- All (30) had air releases, or fire, or explosion.
- Eighteen involved fire or explosions with or without additional air releases.
- Twelve seemed to be primarily air releases of toxic materials, with no fire or explosion.

Even though the recent U.S. accident experience is much less severe than the worst cases that have happened world-wide or in previous times, the patterns are similar. The lack of accidents resulting in airborne toxic exposure has drastically limited large-scale casualties. Toxic, fire, and explosion hazards are active contributors to most accidents with serious adverse consequences.

AHE and ARIP Analysis. In a recent analysis performed for EPA to determine whether the properties of chemicals represent an important factor in setting accident prevention and response priorities, 20 chemicals were identified. These 20 chemicals accounted for over half of the serious events at fixed facilities contained in the Acute Hazards Event and in the Accidental Release Program Databases. Figure 1-13 (on the next page) lists those chemicals along with the number of events in which they appear and the resulting casualties. Appendix 1-C contains the complete analysis.

Property Damage. Several sources of information are routinely compiled which give some estimation of property damage at both fixed facilities and during transportation from accidents involving hazardous materials. While not exact, the monetary losses which can and do result from large-scale accidents are costly to the industry which suffers the accident, and often to the community in which the facility is located.

The Department of Transportation collects information on property damage from every written accident report it receives on incidents involving hazardous materials. Figure 1-14 represents data collected on property damage resulting from accidents involving hazardous materials by transportation mode from 1987-1991.

Figure 1-14: Hazardous Materials Incidents
Damage estimates (in dollars) by Year, and Mode

U.S. Department of Transportation

MODE	1987	1988	1989	1990[10]	1991	TOTAL
AIR	13,779	562,176	104,936	141,988	77,040	899,919
HIGHWAY	15,528,734	18,475,190	15,233,111	19,948,424	29,539,605	98,725,064
RAILWAY	7,716,725	2,180,697	10,632,203	11,951,572	8,466,664	40,947,861
WATER	54,930	74,262	39,900	69,898	154,395	393,385
FREIGHT FORWARDER	51,126	15,009	37,655	0	0	103,790
OTHER	50	2,700	2,600	0	0	5,350
TOTAL	23,365,344	21,310,034	26,050,405	32,111,882	38,237,704	141,075,369

[10] Beginning in 1990, shippers and carriers, when reporting damages, are now specifying the types of damages incurred during an incident, i.e. product loss, carrier loss, public/and private sector damages, decontamination and clean-up costs, and other costs.

Figure 1-13: Top 20 Chemicals Ranked by the Number of Serious Events [8]
1982 - 1991

Chemical[9]	No. of Events	No. of Serious Events	Events with Injuries	Numbers of Injuries	Number of Death Events	Number of Deaths	Events with Evacuations	Number of Evacuees
Phosgene	39	19	16	334	2	2	6	1,209
Methyl Ethyl Ketone	40	12	9	109	4	6	4	479
Nitric Acid	127	38	29	428	4	21	15	17,294
Hydrogen Chloride	386	112	83	1,139	1	1	46	55,690
Phenol	46	13	8	8	1	1	5	940
Toluene	104	26	21	88	8	14	10	3,030
Methyl Alcohol	49	12	8	29	3	9	5	3,275
Hydrogen Fluoride	83	20	17	1,093	2	3	3	6,050
Sodium Hydroxide	175	42	35	51	1	1	9	5,110
Chlorine	1,126	268	246	1,715	5	6	53	81,229
Styrene	66	15	11	32	0	0	7	17,250
Sulfuric Acid	418	94	83	425	7	8	20	14,145
Phosphoric Acid	86	18	14	383	0	0	6	18,780
Benzene	82	16	14	442	3	17	5	5,050
Methylene Chloride	76	13	11	484	1	2	4	3,750
Ammonia	1,151	187	150	801	4	9	61	22,313
Sulfur Dioxide	291	32	29	254	0	0	5	652
Hydrogen Sulfide	232	20	20	192	2	3	6	3,082
Vinyl Chloride	230	12	8	67	2	6	8	17,686
Ethylene Oxide	322	12	8	137	0	0	6	36,225
Subtotal	5,129	981	820	8,211	50	109	284	313,239
Other Events	8,158	1,010	793	11,308	131	380	369	337,675
TOTAL	13,287	1,991	1,613	19,519	181	489	653	690,914

[8] Serious events involve one or more deaths or injuries or evacuees.
[9] Casualties included in the AHE database do not distinguish between whether the casualty resulted from the hazardous material or some other factor in the event.

In addition to DOT collection of property damage information from carriers involved in hazardous materials accidents, information regarding property losses is also collected by the private sector. The firm of Marsh & McLennan Protection Consultants annually publishes data on losses resulting from accidents and natural phenomena in the hydrocarbon processing and chemical industries. In the 1992 publication, a summary of the analysis of the 30 year period spanning 1962-1991 was reported. The 170 losses examined represented more than $7.35 billion in property damage in constant dollars. The information also shows that the cost and number of losses is increasing, as illustrated in Figure 1-15. Individual losses varied from $10.8 million to $715 million, with an average loss of $43.2 million and a median loss of $23.5 million. These figures represent physical damage only and do not account for financial loss from business interruption, liability, worker's compensation, or other consequential losses. The study indicates that the availability of more and better information is a partial explanation for the increases in number and costs over the thirty year period. However, the study suggests that a more significant force behind the trend in higher losses is likely to be the ever greater concentration of assets to achieve economies of scale in these capital intensive industries. That is, if there is more invested in plants and equipment, there is more to lose.

The study also analyzed losses by type of complex, as shown in Figure 1-16. Excluded are offshore production accidents and losses involving marine vessels unless the loss occurred while the vessel was at a plant dock.

As evidenced by the information on property damage, while losses of catastrophic proportion are relatively rare, the very nature of operations in the hydrocarbon processing and chemical industries presents the potential for events that can severely affect employees, the public, corporations, and shareholders.

Recent Analyses of the Accident Picture

Most analyses are used to identify common characteristics about accidents in order to learn why accidents happen. Overall, accidents usually result from a combination of failures or causes including equipment failure and operator error; a handful of chemicals make up the majority of releases; chemical accidents largely occur in the chemical and petroleum industries; and, releases of certain chemicals are disproportionately linked with death/injury events. The following are publications and reports that contain specific accident analyses.

Chemical Accident Prevention Bulletin 1989 - This EPA bulletin summarized the results of an analysis of approximately 300 facility questionnaires. The results asserted that accidents are caused by failures to provide adequate operator training, to limit or cope with equipment failure, to identify hazards, and to conduct inspections and maintenance.

Chemical Accident Publication (in progress, expected 1992). This EPA publication will summarize 3,000 facility questionnaires. The data show that:

- Often more than one cause contributes to a hazardous materials accident (e.g., typically equipment failure and human error);
- Hazardous materials accidents occur at any time during the life cycle of the material, not just at manufacture;
- The size of the release, or the size of the business enterprise, is not directly related to numbers of injuries, deaths, or the size of an evacuation;
- Preventive maintenance and inspection are key to reducing equipment failure;
- A few chemicals make up a majority of the releases in this database; certain chemicals represent a disproportionate share of injuries; and,

Figure 1-15
Loss Distribution at 5-Year Intervals

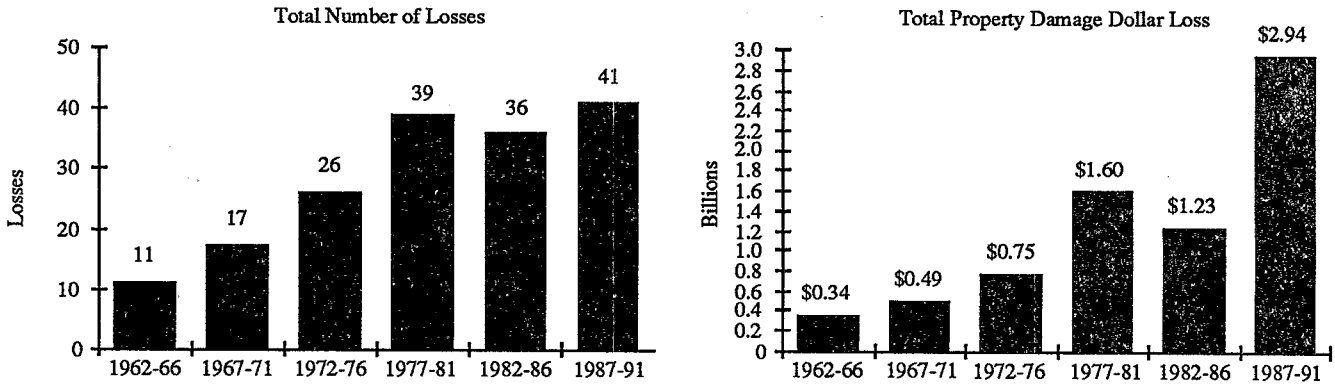
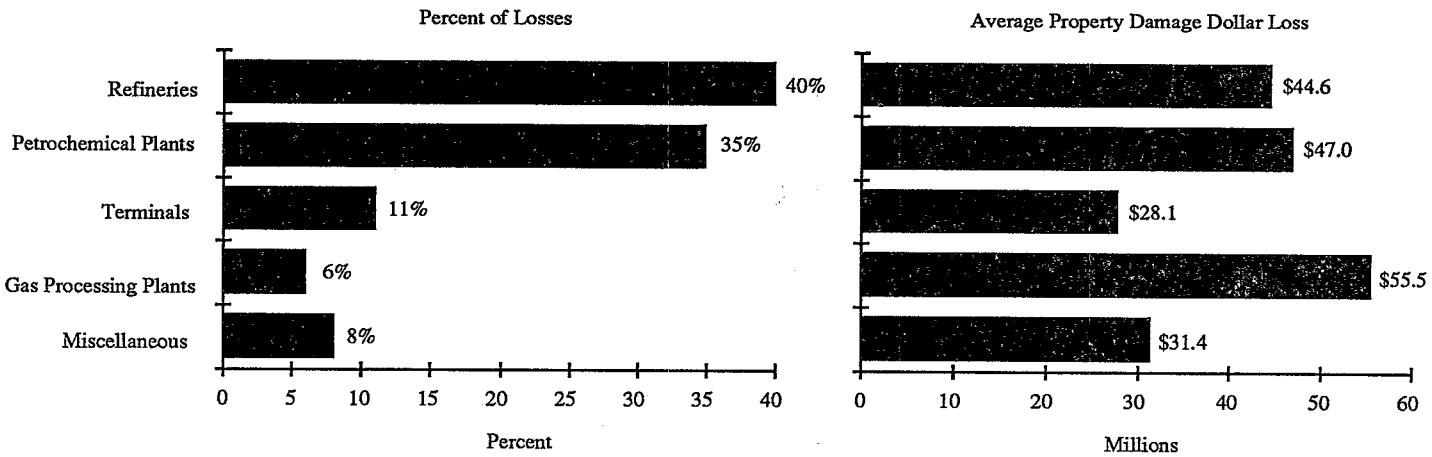


Figure 1-16
Loss Distribution by Type of Complex



- Standard operating procedures ensure that employees on each shift know safe practices under normal circumstances; however, poorly trained employees or flawed standard operating procedures greatly contribute to causing a release.

Analysis of EPA Regional Office Data on Accidental Chemicals 1989 (AHE) - The noteworthy findings of the study indicated that:

- Injuries and death [10] occurred much more frequently in accidents resulting in fires and explosions than in accidents involving spills or vapor releases;

- Substances most frequently involved in accidents are all large-volume industrial chemicals with broad commercial distribution; and

- Most accidents occurred during steady state operations.

Acute Hazardous Events Data Base Report 1989 (AHE) - This report is a study of events with acute hazard potential (e.g., incidents resulting in deaths, injuries, or evacuation) in support of EPA's effort to assess and respond to the dangers posed to the U.S. public and workers by sudden, accidental releases of toxic chemicals. The major findings were that:

- More than a third of events with deaths or injuries occurred during releases of less than the reportable quantity (RQ). Therefore, such events may not be reported to the federal government. [10]

- The severity of the outcome of a release has some relationship to its toxicity; and

- Primary chemical producers and distributors make up the greatest percentage of events that result in a death or injury.

Report of the EPA Hazardous Substances Task Force, April 1992. This report evaluated the ability of the federal government to prevent and respond to releases similar to the metam sodium release on July 14, 1991. The task force conducted analyses necessary to identify and characterize past releases.

Annual Report on Hazardous Materials Transportation. This annual report presents statistics on transportation events and summarizes release trends by media, mode, hazard class, and impact (fatality, injury). The data from the 1990 Annual Report showed that:

- For a variety of reasons there appears to have been an increase over the last two years in incidents and property damage. The wide distribution of the 5800.1 reporting form, as well as an improved level of reporting by railroads and air and highway small package carriers, resulted in an increase in the number of reported incidents.

- Corrosive materials and flammable liquids (e.g., gasoline) make up most of the transportation related releases and injuries resulting from hazardous materials.

- Over 85 percent of the hazardous waste incidents in transportation occurred on the highway.

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[10] AHE database does not distinguish between deaths and injuries due directly to the hazardous materials and deaths and injuries associated with other aspects of the event.

PROBLEMS WITH INFORMATION

Based on a review of various studies on the accident picture as portrayed by existing information on accidents involving hazardous materials, several important deficiencies in information become apparent. These gaps include deficiencies in the availability and quality of information, and deficiencies in knowledge about certain impacts of accidents.

Deficiencies in the Availability and Quality of Information

Deficiencies in the availability of information as well as its quality were found to exist. These deficiencies result from differing reporting requirements, differing receiving entities, non-comparable data sets, and under-reporting by the regulated community. The existence of discrepancies between state and federal data on transportation and fixed facility accidents involving hazardous materials has been documented by several studies. Some of these discrepancies are due, in part, to different reportable quantities for state requirements versus federal requirements, as well as different materials to be reported. Other discrepancies are due to differences in the areas for which accidents are reported, i.e., state data includes intrastate as well as interstate information and federal agencies often have differing definitions of which accidents need to be reported.

As previously indicated, under-reporting of accidents is an issue for transportation as well as fixed facility accidents involving hazardous materials. Efforts to determine the extent of under-reporting for fixed facilities have not been studied with any degree of detail. This may be due, in part, to the vastness of the regulated community, i.e., difficulties inherent in identifying facilities which must report, particularly for production, storage, use, and to a lack of comparative data from states. Although some states have developed sophisticated tracking systems for hazardous materials accidents, (California, for example), differences in reportable quantities and the universe of materials regulated may make determination of the extent of under-reporting difficult to ascertain for accidents at fixed facilities. With changes in regulations as a result of the Hazardous Materials Transportation Uniform Safety Act (HMTUSA), the federal government will begin gathering information on intrastate as well as interstate transportation incidents involving hazardous materials which should begin to address the under-reporting issue for transportation.

A third gap in the availability and quality of information is the absence of information and studies for determining whether the accidents for fixed facilities are increasing or decreasing over time, i.e. the rate of accidents as measured by the level of industrial activity. The amount of accident information recorded, the multiple purposes for which that information is taken, and the labor intensity required to verifying reported incidents are among the factors which have precluded analyses of accident rates.

Deficiencies in Information about Accident Impacts. The chronic health effects of many hazardous materials accidents are not known. Information is also lacking on the ecological impacts of accidents. In the recent study from the EPA Hazardous Substance Task Force on Hazardous Substances, the lack of health and ecological criteria for listing or classifying hazardous materials, and the difficulties in identifying such criteria, were explored.

While little is known about chronic health impacts, the Agency for Toxic Substances and Disease Registry (ATSDR) has begun a study, in conjunction with nine states, to analyze and describe the risk factors associated with emergency events involving hazardous materials. The study's focus is on establishing a database to determine the health impacts resulting from hazardous materials emergencies. The database will record morbidity and mortality data and identify risk factors that result from hazardous materials releases. State health departments are a primary participant in this study effort.

FINDINGS AND CONCLUSIONS

Several significant findings and conclusions can be drawn based on the available information.

- Accidents or incidents involving hazardous materials happen frequently.

- While the scale of recent U.S. experience is much less severe than the worst cases worldwide, patterns are similar; toxic, fire, and explosion hazards are active contributors to most accidents with serious adverse consequences.

- The ERNS and HMIS databases suggest that accidents involving releases of radionuclides, as reported under the CERCLA hazardous substance list and DOT reporting, are neither common nor severe in the United States.

- The number of casualty incidents, relative to the number of reported release notifications over the 1987-1991 time period, appears small. However, any casualties can have a substantial effect on a local community.

- Deficiencies in information exist, including deficiencies in knowledge about the chronic health effects from hazardous materials accidents, and the ecological damage or potential impact resulting from accidents.

- Deficiencies in information exist for accident and incident rates from accidents involving hazardous materials at fixed facilities, particularly for non-workers. Available studies do not indicate whether accidents or incidents are increasing or decreasing relative to the industrial activity.

- Recent private sector analyses of property damage in the hydrocarbon processing and chemical industries indicate that the costs and number of economic losses resulting in severe consequences is increasing. Further, the 1989 figures revealed significantly greater losses than preceding years. Potential causes of this increase include improved information collection and the aggregation of assets to achieve economies of scale in these capital intensive industries.

- Accidents such as Bhopal and the Exxon Valdez indicate that catastrophic losses can and do occur, although fortunately rarely. The very nature of operations of hazardous materials industries represent the potential for events that can severely affect employees, the public, the environment, corporations, and shareholders.

ACCIDENT REPORTING

Under a variety of statutes and regulations, fixed facilities and shippers, or transporters, are required to report accidental releases of hazardous materials. Differences exist among statutes with regard to whom reports must be made; what chemicals and chemical amounts released require reporting (threshold reporting quantities); when a report must be made; and what information must be included in the report. The statutes governing accident reporting fall into three categories: environmental, transportation, and occupational safety and health. In addition, DOE prescribes accident reporting for DOE facilities. Appendix 1-D discusses in detail accident reporting requirements.

DATABASES GENERATED AS A DIRECT RESULT OF INITIAL ACCIDENT NOTIFICATION

The databases generated by initial accident notifications to the federal government are discussed below. Many chemical accidents require multiple notifications to various agencies and are reported to more than one database. Most of the databases are used in several capacities including: to help determine and support federal policy decisions; to disseminate lessons learned about releases to state and local governments, the public, and the industrial sector; to provide information about emergency response needs; to measure the impact of Agency regulations or initiatives on release frequency; and to support enforcement efforts.

National Response Center (NRC) Incident Reporting Information System (IRIS)

The National Response Center, staffed by the U.S. Coast Guard, collects information nationally on reports of hazardous materials releases as well as releases of hazardous substances and oil from fixed facilities and transportation incidents. These reports are transmitted daily to the Volpe National Transportation Systems Center in Cambridge, MA, into a database which stores both transportation and fixed facility data.

The Center relays reported information to the federal On-Scene Coordinator (Coast Guard or Environmental Protection Agency official) who coordinates federal, state, and local response to the incident. In addition, data collected by the Center serves as the substance for substantial portions of DOT and EPA databases.

Emergency Response Notification System (ERNS)

The Emergency Response Notification System is an EPA database designed to aggregate data reported as notifications to the National Response Center, initial reports to EPA regions, and some data from USCG field offices (only through 1989). When notifications are made to the National Response Center, the data are transferred to the Volpe National Transportation Systems Center in Cambridge, Massachusetts and into the shared database for DOT's and HMIS telephonic system and EPA's ERNS system. Regional offices will screen ERNS data to identify reported spills of interest; ERNS is also used to support policy and regulatory initiatives. While ERNS was not necessarily developed as an analytical tool, it is being used with increasing frequency for such purposes. ERNS data has been collected since 1986. EPA regions verify the reports to varying levels of detail after the report is received, however the ERNS system contains duplicate records (estimated at 5%).

Hazardous Materials Information System (HMIS)

The Hazardous Materials Information System is a data system maintained by DOT which includes a database containing over 195,000 records of written reports on unintentional hazardous materials releases from transportation incidents since 1971. HMIS also includes telephonic reports to the National Response Center from 1984 to the present on transportation incidents which meet specified reporting requirements (see Appendix 1-D). Primarily, HMIS serves as an information resource allowing managers to monitor the performance of DOT's hazardous material transportation program. Information includes carrier name, shipper name, mode of transport, release due to vehicular accident or derailment, number of containers shipped, reason(s) for failure of containers, amount of material released, and consequences such as the number of deaths or injuries and the number of individuals evacuated. HMIS identifies transportation incidents and can indicate those deaths and injuries directly attributed to a release and those attributed to the physical impact of the accident (e.g. collision).

HMIS, the primary source of national data for hazardous material transportation, is used by DOT to identify emerging safety problems, monitor compliance efforts, and supply analytical justification for regulatory proposals. HMIS information is systematically collected based on a reporting regulation and verified through follow-up reports. Also, HMIS specifies whether the chemical release or some other factor (e.g. train collision) was responsible for a death or injury. In addition, HMIS contains property damage and cleanup cost information. Thus, HMIS provides a reference source for information about types, causes, and costs of chemical releases from transportation accidents.

Marine Safety Information System (MSIS)

The U.S. Coast Guard maintains the Marine Safety Information System which gathers information on about 12,000 fixed facilities and transportation accidents per year. Chemicals covered include petroleum, CERCLA, and non-CERCLA substances.

MSIS automates critical Coast Guard data gathering activities to provide support to overall mission performance. The data includes vessels' history, waterfront facilities, involved parties, and vessel owners and operators. The information is used to prioritize boardings to maximize use of Coast Guard resources for prevention, response, investigations, ship inspections, and pollution response.

MSIS is accessed by Coast Guard Marine Safety Offices throughout the United States, district offices, and headquarters. MSIS captures the majority of the data that the Office of Marine Safety, Security and Environmental Protection uses to carry out its missions.

Ports and Waterways Management Information's System (PAWMIS)

The Coast Guard is currently developing a new database that will be integrated into the larger Marine Safety Network (MSN). The goal of PAWMIS is to fulfill the USCG's information requirements related to port safety activities.

Other Databases

Each modal administration of the Department of Transportation maintains an accident database with various reporting requirements, some of which include information on hazardous materials accidents. Data from RSPA HMIS database and the other DOT modal administrations share and use each others databases. This report does not detail these individual systems, although reporting requirements are discussed in Appendix 1-D.

ACCIDENT INVESTIGATIONAND RESPONSE

Once accident notification has been made, additional notifications by and to appropriate response authorities are made. Emergency responders may be dispatched and accident investigations may be undertaken. Initial accident reports are then compiled into a database or databases dependent upon which federal, state, or local response notification center received the report. Accident databases are often merged, queried, or reviewed by appropriate agencies or offices within agencies for a variety of analyses and other uses. The following databases are generated as a result of various forms of accident investigations.

Integrated Management Information System (IMIS)

The Integrated Management Information System, maintained by the Occupational Safety and Health Administration contains records of accident inspections. These inspections were conducted in response to a worker death, or five or more worker hospitalizations, or if hazards in the workplace were reported. The IMIS database is geared to releases that have more on-site rather than off-site consequences. Information in the database includes facility name, short description of the accident, number and nature of the deaths and injuries, the type of human error involved, and the hazardous substance released. Most of the accidents do not involve chemicals. Also, sometimes when a chemical is indicated, the accident or injuries/deaths may not be a direct result of the accident. In 1990, there were approximately 600 reported accidents directly or indirectly involving a chemical.

OSHA also has the OSHA Computerized Information System which is operated from OSHA's Technical Center in Salt Lake City, Utah. This database contains information on OSHA standards, hazardous substances, OSHA regulated substances, emergency response information, hazard investigation and exposure data from compliance inspections, and other data.

Accidental Release Information Program (ARIP)

The Accidental Release Information Program database, developed by EPA, contains about 3,000 records of chemical accidental release events that have occurred since October, 1986. The purpose of the ARIP database was to collect more detailed information on the causes of accidents, the efforts already in use at the facility to prevent chemical accidents, and the changes to prevent a recurrence. ARIP was started

because no other database in operation contained such information. The information is provided by the facilities several months after the release.

Collection of ARIP data is triggered initially by incidents recorded on the ERNS system. Facilities are required under CERCLA to report releases of CERCLA hazardous substances when such releases exceed a reportable quantity (RQ). EPA periodically screens the ERNS database to find events that meet one or more of certain triggers. EPA then sends a detailed questionnaire to the facility that reported the release event that meets these criteria. When the questionnaire is returned, the data is encoded into the ARIP database.

In addition to routine information such as the chemical released, the amount lost, the media affected (air, water, etc.) and consequences of the release (deaths, injuries, evacuations), ARIP captures unique details such as the duration of the release, circumstances leading up to the release, whether a hazard evaluation was conducted for the process where the release occurred and changes instituted or planned to prevent the release from reoccurring. Note however, that ARIP is not statistically representative of all industry. ARIP is designed to capture reported events involving CERCLA hazardous substances or EPCRA extremely hazardous substances with more severe consequences. It does not contain events associated with flammable or petroleum products.

ARIP analyses have been used by EPA headquarters and regions to support policy decisions including most recently the planning of the Chemical Hazard Investigation Safety Board, the analysis of the regulatory impact of the Clean Air Act (CAA) mandated Risk Management Plans, the establishment of a basis for the CAA section 112(r)(7) regulations, and the findings of the Report of the EPA Hazardous Substances Task Force. ARIP contains verified information on the most serious or potentially serious releases.

Occurrence Reporting and Processing System (ORPS)

The Occurrence Reporting and Processing System database provides the Department of Energy (DOE) with a readily accessible database containing information about occurrences [11] at DOE facilities, causes of those occurrences, and corrective actions. This information can be used to identify and analyze trends in occurrences. The database resides on a host computer at the Idaho National Engineering Laboratory in Idaho Falls, Idaho, and can be accessed from any DOE site via computer 24 hours a day. Since September 1, 1990, approximately 6,000 to 8,000 occurrence reports have been entered annually.

National Fire Incident Reporting System/FEMA (NFIRS)

The U.S. Fire Administration (USFA) employs a data collection system with information on fires. This system is called the National Fire Incident Reporting System (NFIRS). NFIRS gathers data from 41 states. In 1990, data on hazardous materials incidents began to be collected in the NFIRS System. In the first year, information was collected from only five or six states and approximately 85 incidents were recorded. The first full year of data collected using this system was 1991, however, only a small number of states were involved. In 1992, states, representing approximately 210 fire departments, are supplying data. For the first half of 1992, over 600 hazardous materials incidents have been reported. Among the data fields used in this system are the type of site (fixed or transportation), the chemical involved, and the injuries and deaths resulting from the incident. NFIRS has been used to analyze factors involved in fire incidents, and, in some cases, has brought about changes leading to increased safety.

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[11] As defined under DOE Order 5000.3A, occurrences are defined as all events or conditions that could: (1) affect the health and safety of the public; (2) seriously impact the intended purpose of DOE facilities; (3) have a noticeable adverse effect on the environment; or (4) endanger the health and safety of workers. Occurrences are categorized by their seriousness to ensure the more serious occurrences are highlighted to management. The categories are defined in DOE Order 5000.3A.

Hazardous Substance Emergency Event Surveillance (HSEES) Database

The Agency for Toxic Substances and Disease Registry's database describes the release or threatened release of specific hazardous substances and the resulting public health consequences (e.g., death, injuries, evacuations).

State Databases

Some state databases are based on federal regulations. For example, under section 304 of EPCRA, facilities must report releases of extremely hazardous substances and CERCLA hazardous substances to Local Emergency Planning Committees (LEPC) and State Emergency Response Commissions (SERC). Other state databases are authorized through state regulations. For example, the Texas Air Control Board and the New Jersey Department of Environmental Protection maintain a database of reports of air releases that meet certain criteria. Additionally, the California Hazardous Material Incident Reporting System which is assembled strictly under the auspices of the California Office of Emergency Services contains information on hazardous substance releases. Many other states also collect similar information, as do many large cities.

DATABASES DERIVED FROM ACCIDENT STATISTICS

Acute Hazardous Events (AHE) Database

The Acute Hazardous Events database was developed by EPA to provide an historical perspective on the magnitude of chemical accidents in the United States in response to the Bhopal, India disaster. The database contains about 6,200 records that represent information on roughly 11,000 incidents that occurred primarily between 1982 and 1986. Data on the events were collected from a variety of sources including the United Press International (UPI), Associated Press (AP), 26 daily newspapers, EPA Region VII office files, six offices of five state governments and from spill reports to the National Response Center (NRC). The data collection was only intended to provide a "snapshot" of the number of chemical accidents occurring at fixed facilities and transportation, fire and explosion events and toxic releases, and the degree of deaths, injuries, evacuations and environmental damage associated with these kinds of incidents in the United States. The data is provided by secondary sources and has not been thoroughly verified. Therefore, caution should be used when interpreting certain findings.

PROBLEMS WITH EXISTING DATABASES AND DATABASE MANAGEMENT

Historically, coordination of accident reports, determination of their veracity, and evaluation of accident trends has generally been deficient. Our understanding of the true accident picture is limited because of differing threshold reporting requirements and other reporting criteria, multiple reporting sources, and the lack of data on hazardous materials production and shipment.

All of the information reported to the federal government is maintained by the respective agencies with reporting requirements or programs. These agencies have established their databases, for the most part, independently of one another. No mechanism exists to facilitate coordination among agencies regarding database management. Therefore, streamlining or standardization of data elements and other improvements to federal data management with respect to hazardous materials emergencies have been limited. The absence of policy incentives to coordinate and improve cross-agency database management and other barriers to support such coordination impede progress.

Because of the purpose, development, and nature of the databases, the types and comprehensiveness of the information varies. Consequently, some databases are better suited to certain analyses than other databases. The following is a summary of the limitations of the databases.

Terminology often differs from one database to another. Chemical synonyms cannot be accounted for and terms such as "injury"or "accident" may be defined differently for DOT, OSHA, and EPA. Difficulties in linking databases occur because several databases use different technologies. Also, the current

operating program for data access differs from database to database. Even if the databases could be combined, the accuracy of the database information varies. Because of the limited availability and specialized value of some databases, the databases may be misused in providing information for public policy decisions. For example, analyzing the ERNS database on the datafield chemical quantity released may provide erroneous results because ERNS contains mostly initially reported, and many times inaccurate, quantities released. Also, most databases, HMIS being the exception, measure the number and types of accidental chemical releases and therefore are not geared to measure the success of initiatives or regulations to prevent accidental releases. In addition, several databases suffer from under-reporting and therefore need correction factors.

Specific Database Limitations:

ERNS ERNS contains initial release notifications, some of which may be inaccurate, and ERNS captures only CERCLA or petroleum releases. Also, ERNS does not specify whether the chemical release or some other factor (e.g., fork lift collision) was responsible for the death or injury. ERNS data does not necessarily capture only emergency notifications, thus skewing the understanding of the real accident picture. Other problems include underreporting, i.e., spills required to be reported which are not reported; reports of spills which are not legally required to be reported because the substance is not regulated, the releases was below the RQ, or the oil never reached water; or spills reported to state offices and not federal offices or vice versa.

ARIP For several years, the ARIP questionnaire was revised so that some information was added and other information was deleted. Thus, analysis on several datafields cannot be performed on the entire database. Also, the short description of the accident is not contained in the database and therefore must be analyzed in the hardcopy questionnaire form. In addition, ARIP contains only 3,000 records, and is developed from accidents meeting certain specific criteria.

AHE AHE does not contain information from primary sources, the information is not verified, and the data spans only five years (1982 - 1986). AHE does not specify whether the chemical release or some other factor was responsible for the death or injury.

HMIS Sometimes the chemical information is provided as a category (e.g., pesticides or flammable liquids) rather than as an individual chemical name.

IMIS/
OSHA Prior to 1990, the data was not complete because some states did their own reporting, and did not provide the data to OSHA. Also, the hazardous substance information is not given as a CAS number so that an analysis based on the chemical is difficult to conduct. In addition, the database does not specify whether the chemical release or some other factor (e.g., fork lift collision) was responsible for the death or injury.

FINDINGS

- Regulations regarding accident notification and reporting are different based on different statutes, and the regulated substances specified by those statutes.

- Multiple notifications are required and multiple accident databases have been developed by the various regulatory agencies to monitor releases of hazardous materials and/or to record and track accident information.

- While the reasons for the variety of different databases operated by the regulatory agencies are, in most instances, valid, the absence of comparable data sets and standard definitions, and the lack of

database coordination among agencies inhibits comparative analysis and cross-agency use of accident data.

- Most data contained in accident databases are unverified.

- Existing databases do not allow for analyzing chronic health impacts or ecological impacts of accidents involving hazardous materials.

- A coordination body for database management among agencies does not exist. Further, few incentives exist to encourage such coordination, and many barriers inhibit it.

Consolidation of existing databases used by each agency or department is probably not realistically feasible, nor preferable. However, other steps should be taken to make existing data more usable, available, and comparable, and to make database management more efficient and effective.

One option needing further exploration is streamlining the accident databases so that databases which are not useful, or used extensively, and data elements which do not serve useful functions are eliminated. Further, in the process of streamlining databases, comparable elements and terms should be incorporated across databases, to improve accessibility and comparability of the information collected. The information collected and included in the databases should serve specific identifiable program needs, and database revisions should support the identified purpose of the system.

To address data quality and completeness associated with large databases such as ERNS, data sampling techniques could be used to create an extensively validated random sample of events. **Transport Canada has developed a case study database which they use to statistically predict costs, causes of accidents, and trends.** Such a case-study database could result in useful analyses of accident trends and costs for future policy development.

Interagency collection of accident data and database coordination need improvements. Additional focus on what mechanism should be used to address data and database coordination within the Executive Branch is needed.

This forum, once identified, should address such concerns as:

- How to encourage reporting;
- How to improve the validity of accident reports;
- How to harmonize and streamline accident/incident reporting;
- How to incorporate or link information from accident investigation into databases;
- Identification of ways to improve analysis of the accident data and trends, and to use such analyses for policy development;
- How to use and integrate updated information management technologies within and across federal and state agencies; and
- How to ensure that access to information is provided to appropriate parties, including the public.

APPENDIX 1-A
U.S. DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS SAFETY
COMMODITY SUMMARY BY INCIDENTS RANK -- 1987-1991

RANK	COMMODITY NAME	HAZARD CLASS	INCIDENTS
1	Corrosive Liquids N.O.S.*	Corrosive Material	2383
2	Flammable Liquids N.O.S.*	Flammable - Combustible Liquid	2076
3	Compound Cleaning Liquid	Corrosive Material	1947
4	Gasoline	Flammable - Combustible Liquid	1880
5	Hydrochloric Acid Solution	Corrosive Material	1634
6	Sulfuric Acid	Corrosive Material	1546
7	Fuel Oil No. 1,2,4,5,6	Corrosive Liquid	1313
8	Resin Solution	Flammable - Combustible Liquid	1305
9	Paint or Paint Related	Flammable - Combustible Liquid	1101
10	Sodium Hydroxide Solution	Corrosive Material	1087
11	Phosphoric Acid	Corrosive Material	764
12	Adhesives	Flammable - Combustible Liquid	717
13	Methanol	Flammable - Combustible Liquid	652
14	Caustic Alkali Liquid N.O.S.*	Corrosive Material	543
15	Ink Printers Flammable	Flammable - Combustible Liquid	539
16	Isopropanol	Flammable - Combustible Liquid	461
17	Potassium Hydroxide Solution	Corrosive Material	454
18	Petroleum Gases Liquefied	Flammable Gas	411
19	Combustible Liquid N.O.S.*	Combustible Liquid	391
20	Ammonia Solutions 10-35%	Corrosive Material	381
21	Xylenes	Flammable - Combustible Liquid	367
22	Ethanol	Flammable - Combustible Liquid	359
23	Compound Cleaning Liquid	Flammable - Combustible Liquid	358
24	Ammonia Anhydrous	Nonflammable Compressed Gas	336
25	Poisonous Liquids N.O.S.*	Poisonous Materials	290
26	Hypochlorite Solution 5-16%	Corrosive Material	285
27	Paint Related Material	Flammable - Combustible Liquid	276
28	Toluene	Flammable - Combustible Liquid	257
29	Naphtha Petroleum	Combustible Liquid	245
30	Naphtha Petroleum	Flammable - Combustible Liquid	244
31	Hazardous Substance N.O.S.*	Miscellaneous Hazardous Material	230
32	Cement	Flammable - Combustible Liquid	216
33	Acetone	Flammable - Combustible Liquid	202
34	Corrosive Solids N.O.S.*	Corrosive Material	200
35	Extracts Flavoring Liquid	Flammable - Combustible Liquid	198
36	Acetic Acid Solution	Corrosive Material	195
37	Compound Cleaning Liquid HCL	Corrosive Material	193
38	Hazardous Waste N.O.S.*	Miscellaneous Hazardous Material	191
39	Denatured Alcohol	Flammable - Combustible Liquid	183
40	Styrene Monomer Inhibited	Flammable - Combustible Liquid	178
41	Alcohols N.O.S.*	Flammable - Combustible Liquid	171
42	Coating Solution	Flammable - Combustible Liquid	171

RANK	COMMODITY NAME	HAZARD CLASS	INCIDENTS
43	Petroleum Crude Oil	Flammable - Combustible Liquid	170
44	Hydrogen Peroxide 40-60%	Oxidizer	170
45	Methyl Methacrylate Inhibited	Flammable - Combustible Liquid	169
46	Nitric Acid (over 40%)	Oxidizer	164
47	Fuel Oil	Combustible Liquid	160
48	Acid Liquid N.O.S.*	Corrosive Material	158
49	Flammable Liquid Corrosive	Flammable - Combustible Liquid	147
50	Hydrofluoric Acid Solution	Corrosive Material	138

* Not Otherwise Specified.

APPENDIX 1-B
U.S. DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS SAFETY
COMMODITY SUMMARY BY TOTAL INJURIES RANK -- 1987-1991

RANK	COMMODITY NAME	HAZARD CLASS	TOTAL INJ
1	Sulfuric Acid	Corrosive Material	115
2	Corrosive Liquids N.O.S.*	Corrosive Material	77
3	Flammable Liquids N.O.S.*	Flammable - Combustible Liquid	76
4	Hydrochloric Acid Solution	Corrosive Material	70
5	Ammonia Anhydrous	Nonflammable Compressed Gas	60
6	Sulfur Dioxide Liquefied	Poisonous Gas	60
7	Sodium Hydroxide Solution	Corrosive Material	52
8	Ethyl Mercaptan	Flammable - Combustible Liquid	51
9	Gasoline	Flammable - Combustible Liquid	48
10	Petroleum Gases Liquefied	Flammable Gas	31
11	Phosphoric Acid	Corrosive Material	30
12	Combustible Liquid N.O.S.*	Combustible Liquid	28
12	Formaldehyde (F.P. > 141F)	Miscellaneous Hazardous Material	28
12	Resin Solution	Flammable - Combustible Liquid	28
15	Hydrazine Hydrate	Corrosive Material	25
16	Chlorine	Poisonous Gas	22
17	Sodium Hydroxide Solid	Corrosive Material	21
18	Poisonous Liquids N.O.S.*	Poisonous Materials	20
18	Potassium Hydroxide Solution	Corrosive Material	20
20	Acrylic Acid Inhibited	Corrosive Material	19
20	Compound Cleaning Liquid	Corrosive Material	19
20	Pyridine	Flammable - Combustible Liquid	19
23	Ammonia Solutions 10-35%	Corrosive Material	18
23	Flammable Liquid Corrosive	Flammable - Combustible Liquid	18
23	N,N-Dimethylaniline	Poisonous Materials	18
26	Acetic Anhydride	Corrosive Material	17
26	Hydrogen Peroxide 40-60%	Oxidizer	17
28	Compressed Gas N.O.S.*	Nonflammable Compressed Gas	15
29	Nitric Acid < 70%	Corrosive Material	13
29	Sulfuric Acid Fuming	Corrosive Material	13
29	Paint or Paint Related	Flammable - Combustible Liquid	13
32	Benzaldehyde	Combustible Liquid	12
33	Hypochlorite Solution 5-16%	Corrosive Material	11
33	Petroleum Distillate N.O.S.*	Flammable - Combustible Liquid	11
33	Phenol Solid	Poisonous Materials	11
36	Caustic Alkali Liquid N.O.S.*	Corrosive Material	9
36	Compound Cleaning Liquid HCL	Corrosive Material	9
36	Hydrogen Chloride Anhydrous	Poisonous Gas	9
36	Nitric Acid (over 40%)	Oxidizer	9
36	Oxidizing Substance Liquid Corrosive	Oxidizer	9
36	Potassium Permanganate	Oxidizer	9
36	Sulfuric Acid Spent	Corrosive Material	9
36	Sulfur Dioxide Liquefied	Poisonous Gas	9

RANK	COMMODITY NAME	HAZARD CLASS	TOTAL INJ
36	Toluene Diisocyanate	Poisonous Materials	9
36	1,1,1-Trichloroethane	Poisonous Materials	9
46	Acetaldehyde	Flammable - Combustible Liquid	8
46	Acid Liquid N.O.S.*	Corrosive Material	8
46	Compressed Gas N.O.S.*	Flammable Gas	8
46	Ethyl Acrylate Inhibited	Flammable - Combustible Liquid	8
46	Methyl Bromide	Poisonous Gas	8
46	Methyl Methacrylate Inhibited	Flammable - Combustible Liquid	8
46	Propargite	Miscellaneous Hazardous Material	8

Not Otherwise Specified.

APPENDIX 1-C

CHARACTERISTICS OF CHEMICALS INVOLVED IN SERIOUS ACCIDENTS

The properties of the chemicals being handled represent an important factor in setting priorities for industrial chemical accident prevention and response. Data in the AHE database and ARIP database were examined to determine whether chemical properties serve as an effective predictor of the severity of a chemical accident. Three parameters were examined from this perspective: (1) Level of Concern (LOC), a parameter used to rate chemicals' acute toxicity; (2) Flammability, a parameter ranging from 0 to 4 used by the National Fire Protection Agency (NFPA) to rate the flammability of substances; and (3) Reactivity, a parameter ranging from 0 to 4 that NFPA uses to characterize a substance's reactivity (or explosiveness). LOC is derived from a toxicity-rating parameter developed by the National Institute of Occupational Safety and Health (NIOSH), designated Immediately Dangerous to Life and Health (IDLH). IDLH is defined as the concentration of a chemical to which an individual can be exposed no longer than ten minutes without suffering permanent damage. LOC segments IDLH values into five categories ranging from 0 to 4. The hazard attributed to a chemical increases as the LOC, Flammability, and Reactivity ratings increase from 0 to 4.

The combined AHE/ARIP database, which covers the ten-year period from 1982 to 1991, contains 13,287 chemical-attributed events,[1] 15 percent (or 1,991) of which are serious events involving one or more deaths, one or more injuries, and/or one or more evacuees. The top 20 chemicals in terms of numbers of serious events are listed in Table 1. These 20 chemicals account for over one-third of all AHE/ARIP events and nearly half of the serious events. Listed for each chemical in Table 1, in addition to its number of events and number of serious events, are the following data: (1) the frequency at which the reported events are serious; (2) their LOC, Flammability, and Reactivity ratings; (3) number of death events and number of deaths; and (4) number of injury events and number of injuries. The chemicals are listed in order of decreasing frequency of their reported events being serious.

National accident databases such as AHE and ARIP do not contain all events occurring over the period of time covered by the database. Three of the reasons for events not being reported are: (1) some events involve chemicals for which a report is not required; (2) quantities released fall below the reporting threshold; and (3) some events are reported to an authority not linked to the national databases. Although not comprehensive, the data in Table 1 are consistent with the premise that a chemical's frequency of release is in general a function of the quantity produced and the number and diversity of uses. For example, 14 chemicals (designated by +) of the 20 chemicals listed in Table 1 were ranked among the top 50 largest volume chemicals produced in the U.S. These 14 chemicals accounted for 37 percent of the total production volume of the top 50 U.S. chemicals in 1987, the mid-point of the period covered by the AHE/ARIP database. Because of the need to understand the nature of serious toxic chemical accidents, the AHE database sought to collect data for 1982 to 1986 on all toxic chemical events[2] in which a death or injury occurred, and ARIP sought to collect similar data for fixed facilities over the 1987 to 1991 time period. As a result, the AHE/ARIP database provides relatively comprehensive coverage of non-transportation-related toxic chemical events over the ten-year period, although some serious events are undoubtedly missing.

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[1] When two or more chemicals are involved in an event, each chemical is assigned the attributes of the event, since it is not possible to discern which chemical (or chemical combination) is responsible for the damages incurred. This results in double counting when determining totals for number of events, number of serious events, number of injury events, number of injuries, et al. Thus, the 9,143 records contained in the AHE/ARIP database translate into 13,287 chemical-attributed events, as indicated in Table 1.

[2] Petroleum and petroleum products used primarily as fuels were excluded from the AHE database.

It can be seen in Table 1 that 13 of the 20 chemicals involved in the largest number of serious accidents have LOC values of 3 or 4; and that none of the chemicals has an LOC value less than 2. Five of the seven chemicals having LOC values less than 3 have flammability ratings of 3 or more. Among the six chemicals not in the top 50 production-volume chemicals, four have an LOC value of 4; and one of the two having an LOC value less than 4 has a Flammability rating of 3. The only two chemicals among the top 20 that have both LOC and Flammability ratings less than 3 are phosphoric acid and methylene chloride. These two chemicals are involved in one death event resulting in two deaths, and in 25 injury events resulting in 867 injuries.

The potential contribution of chemical properties to the extent of severity in serious events was also examined. Quantity divided by IDLH was used as a toxicity-weighted metric representing the toxic potential of a chemical release. The larger the toxic potential, the more potentially damaging the release. Event severity was defined using a combined measure of the deaths, injuries, and evacuations associated with an event. Analysis of the AHE data revealed that event severity is positively and statistically significantly correlated with toxic potential.[3] Since IDLH is inversely related to LOC, higher severity of events having larger values of toxic potential is consistent with the finding in Table 1 that 13 of the 20 chemicals have LOC ratings of 3 or more. A flammability-weighted metric has not yet been used to assess the influence of flammability on event severity. However, examination of AHE data revealed that fires and explosions were associated with over 87 percent of the deaths recorded in the database.[4]

The results of the analysis of the AHE/ARIP database suggest that efforts in toxic chemical accident prevention and response should be directed: (1) primarily toward high volume chemicals having LOC values and/or Flammability ratings of 3 or more; (2) secondly to other high LOC and/or Flammability rating chemicals; and (3) finally to a few other chemicals historically involved in serious accidents. This approach is consistent with the on-going process of listing chemicals of concern and requiring that priority attention be given these chemicals, e.g., 10 of the chemicals in Table 1 (designated by *) are included among the 16 chemicals listed in section 112(r) of the Clean Air Act Amendments (CAA) of 1990.[5] It is envisioned that a systematic accident prevention and response program emphasizing these chemicals of concern will concurrently deal with many non-priority chemicals that represent a lessor, but finite, hazard.

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[3] R.G. Black, et al, Determinants of Severity in Acutely Hazardous Chemical Releases, presented at the Annual Meeting of the Society of Risk Analysis, Washington, DC, October 1989.

[4] J. Cummings-Saxton, et al, "Accidental Chemical Releases and Local Emergency Response: Analysis Using the Acute Hazardous Events Data Base", Industrial Crisis Quarterly 2 (1988) 139-170.

[5] Ammonia and anhydrous ammonia, which are listed separately in CAA section 112(r)(3), are combined in the Table 1 listing.

Appendix 1-C — Table 1: Top 20 Chemicals Ranked by the Number of Serious Events
1982 - 1991

Chemical	No. of Events	No. of Serious Events	Frequency Serious	LOC Rate	REACT Rate	FLAM Rate	No. of Injury Events	No. of Injuries	No. of Death Events	No. of Deaths	No. of Evacuation Events	No. of Evacuees
Phosgene *	39	19	0.487	4	1	0	16	334	2	2	6	1,209
Methyl Ethyl Ketone	40	12	0.300	2	0	3	9	109	4	6	4	479
Nitric Acid +	127	38	0.299	4	0	0	29	428	4	21	15	17,294
Hydrogen Chloride *+	386	112	0.290	4	0	0	83	1,139	1	1	46	55,690
Phenol +	46	13	0.283	3	0	2	8	8	1	1	5	940
Toluene +	104	26	0.250	2	0	3	21	88	8	14	10	3,030
Methyl Alcohol +	49	12	0.245	2	0	3	8	29	3	9	5	3,275
Hydrogen Fluoride *	83	20	0.241	4	1	0	17	1,093	2	3	3	6,050
Sodium Hydroxide +	175	42	0.240	4	1	0	35	51	1	1	9	5,110
Chlorine *+	1,126	268	0.238	4	0	0	246	1,715	5	6	53	81,229
Styrene +	66	15	0.227	2	2	3	11	32	0	0	7	17,250
Sulfuric Acid +	418	94	0.225	4	2	0	83	425	7	8	20	14,145
Phosphoric Acid +	86	18	0.209	2	0	0	14	383	0	0	6	18,780
Benzene +	82	16	0.195	2	0	3	14	442	3	17	5	5,050
Methylene Chloride	76	13	0.171	2	0	1	11	484	1	2	4	3,750
Ammonia *+	1,151	187	0.162	4	0	1	150	801	4	9	61	22,313
Sulfur Dioxide *	291	32	0.110	4	0	0	29	254	0	0	5	652
Hydrogen Sulfide *	232	20	0.086	4	0	4	20	192	2	3	6	3,082
Vinyl Chloride *+	230	12	0.052	4	2	4	8	67	2	6	8	17,686
Ethylene Oxide *+	322	12	0.037	3	3	4	8	137	0	0	6	36,225
Subtotal	5,129	981	0.217				820	8,211	50	109	284	313,239
Other Events	8,158	1,010	0.124				793	11,308	131	380	369	337,675
TOTAL	13,287	1,991	0.150				1,613	19,519	181	489	653	690,914

* Denotes initial chemicals listed under the Clean Air Act Amendments of 1990, section 112(r).
\+ Denotes chemicals listed in the list of top 50 chemicals by quantity produced.

APPENDIX 1-D

ENVIRONMENTAL LAWS & REGULATIONS ON ACCIDENT REPORTING AND OTHER INFORMATION COLLECTION PROVISIONS

Specification of the hazardous materials that may be released, the amount released, who must report the release, when it must be reported and to whom the reports must be made are among the primary provisions for accident reporting included in most environmental laws. Other provisions giving agencies authority to collect additional information are also included in environmental statutes. Following is a discussion of the specific accident reporting components of each environmental law. A detailed discussion of chemical lists is included in Chapter 4. Note: those chemical lists, also referred to in this section, determine what must be reported, and who must report accidents. Hence, changes made in the chemical lists or procedures for clarifying hazards have significant implications for accident reporting.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Reporting and Information Collection Authorities: Section 102(a) and (b), 103(a),(b) and (f), 104(b)(1) and (e)

What Must Be Reported: CERCLA is one of the primary environmental laws with provisions for accident reporting as well as other federal information gathering activities. Section 101(14) of CERCLA defines hazardous substances as substances designated under section 102 and by reference to other environmental statutes including substances already designated under CAA section 112, CWA section 311 and section 307(a), RCRA section 3001 and TSCA section 7. Petroleum products or derivatives are specifically excluded from the CERCLA definition unless the substance is specifically listed.

CERCLA section 102 authorizes EPA to establish reportable quantities (RQs) for release of all CERCLA hazardous substances; section 102(a) also authorizes EPA to designate additional substances and section 102(b) imposes statutorily reportable quantities of one pound until EPA takes regulatory action adjusting the reportable quantities.

CERCLA contains the following exemptions:

- Any federally permitted release as defined by CERCLA section 101(10);
- Any release which is continuous as defined by CERCLA section 103(f), 40 CFR 302.3;
- Certain releases that result in exposure solely within a workplace, CERCLA section 101(22);
- Certain releases from FIFRA registered pesticides in accordance with its purpose, CERCLA section 103(e);
- Emissions from engine exhaust of a motor vehicle, rolling stock, aircraft, or pipeline pumping station, CERCLA section 101(22);
- Normal application of fertilizer, CERCLA section 101(22); and
- Releases of source, byproduct, or special nuclear material from a nuclear incident at a facility subject to the Price Anderson Act requirements, CERCLA section 101(22).

Who Must Report, When, and To Whom: Section 103(a) of CERCLA requires any person in charge of any facility who has knowledge of a release equal to or in excess of the reportable quantity to immediately notify to the National Response Center of the release. Exceptions to the §103(a) reporting requirements are noted above. Section 103(f) provides reporting relief from requirements of notification if the release is a continuous one and meets certain additional requirements.

Follow-up Reports: The law does not specify any additional reporting requirements after immediate notification to the NRC. For continuous release, follow-up notification is required by 40 CFR 302.8.

Other Reporting Authorities: Section 104(b)(1) provides broad authority to undertake investigations, monitor, survey, test, or gather other information deemed necessary whenever there is reason to believe that a release has occurred or is about to occur, or that illness, disease or complaints may be attributable to exposure and a release may have occurred or be occurring. Section 104(e), inter alia, grants persons designated by the President with

the authority to obtain information from any person who has or may have information relevant to a release or threat of release to provide such information or documents relating to such matters. The information required may include the identification, nature and quantity of materials which have been or are generated, treated, stored transported or disposed, the nature and extent of the release or threatened release, and information relating to the ability of a person to pay for or to perform a cleanup.

Emergency Planning and Community Right-to-Know (EPCRA or SARA Title III)

Reporting Authorities: Section 304

What Must Be Reported: EPCRA section 302 required EPA to publish a specified list of extremely hazardous substances (EHSs), chemicals that could cause serious and irreversible damage to health and the environment. Some chemicals listed as extremely hazardous substances under EPCRA are also included in the CERCLA lists of hazardous substances.

EPCRA section 304 contains provisions for what must be reported in the event of a release. There are two lists of chemicals subject to the section 304 emergency release notification requirement. These are: 1) Extremely Hazardous Substances identified under EPCRA section 302; and 2) CERCLA Hazardous Substances reportable under section 103(a) of CERCLA. The release must occur in a manner which would require notification under CERCLA section 103. Thus, the threshold question for section 304 is whether the release would be reportable -- if this substance were covered under CERCLA.

The notification must include: the chemical name or identity of any substance involved in the release; an indication of whether the substance is extremely hazardous; an estimation of the quantity released; the time and duration of the release; the media or medium into which the release occurred; any known or anticipated acute or chronic health risks associated with the emergency; precautions needed as a result of the release; and the names and telephone numbers of persons to be contacted for further information.

Section 304 contains the following additional exemption: any release resulting in exposure to persons solely within the site or sites on which the facility is located.

Failure to report under section 304 is subject to civil or criminal penalties.

Who Must Report, When, and To Whom: Section 304 requires the owner or operator of a facility at which a hazardous chemical (as defined by OSHA's Hazard Communication Standard and EPCRA section 311) is produced, used, or stored to immediately report any releases of an EHS or a CERCLA hazardous substance in excess of its reportable quantity. Reports must be made to the State Emergency Response Commissions and to the Emergency Coordinator of the Local Emergency Planning Committees established under section 301 of EPCRA.

The owner or operator of a facility for which there is a transportation related release over the substance's reportable quantity may meet section 304 reporting requirements by providing the required information to the 911 emergency service or to a telephone operator if the 911 service is not used in the area. For transportation related releases in which the substance is also a CERCLA hazardous substance reports must also be made to the National Response Center. For purposes of section 304, section 329 includes motor vehicles, rolling stock, and aircraft in its definition of facility.

Follow-up Reports: As soon as practicable after a release, the owner or operator of a facility is required to submit written follow-up reports to the appropriate LEPC and SERC. These reports must include all the information required in the initial notice and updated or new information for: 1) actions taken to respond to and contain the release; 2) any known or anticipated acute or chronic health risks associated with the release; and, 3) advise, where possible, regarding appropriate medical procedures. EPA strongly recommends that the cause of the release also be reported.

Clean Water Act (CWA)

Reporting Authorities: Federal Water Pollution Control Act, section 311, 308(a) and NCP 300.51 and 300.65

What Must Be Reported: Section 311(a)(14) defines hazardous substance to include those substances under 311(b)(2). The list is set forth in 40 CFR 116.4 and reportable quantities (RQs) are established in 40 CFR 117.3.

Section 311(b)(5) requires immediate reporting of any discharge of a section 311 hazardous substance equal to or in excess of an RQ to the National Response Center. (40 CFR 117.21) This requirement is also contained in the broader provisions of CERCLA sections 102 and 103. CWA section 311(b)(5) requires the person in charge of a facility or vessel to make an immediate report to the NRC if there is a discharge of oil in quantities that may be harmful to navigable waters from either a vessel or a fixed facility.

Who Must Report, When, and To Whom: Any person in charge of a vessel or an onshore or offshore facility from which a hazardous substance is released in quantities equal to or in excess of RQs, released within a 24-hour period, must immediately report the information to the National Response Center. Criminal penalties may result for failure to comply.

Other Reporting Authorities: Section 308 authorizes EPA to require any owner or operator of a "point source" (or indirect discharger through a municipal treatment system) to establish and maintain records; make reports; install, use and maintain monitoring equipment; sample; and provide other information EPA can reasonably require. EPA may also enter the facility, access records and files, or conduct sampling as needed. EPA regulations also require dischargers to report any noncompliance with their permit which may endanger health or the environment within 24 hours of becoming aware of the problem.

Clean Air Act (CAA) and Clean Air Act as Amended

Reporting Authorities: Section 112(r) and the Chemical Accident Board provisions & CAA section 114.

As noted in Chapter 4, CAA section 112(r) requires EPA to promulgate an initial list of at least 100 substances and thresholds for such substances.

Who Must Report, When, and To Whom: To date, reporting requirements for accidental releases have not been promulgated under the Clean Air Act as amended. However, EPA anticipates that if such a need were ascertained, section 112(r)(7)(A) would provide that reporting authority. Specifically, this section provides for the Administrator to promulgate release prevention, detection, and correction requirements which may include monitoring, record-keeping, reporting, training, vapor recovery, secondary containment and other design, equipment, work practice and operational requirements.

Prior to the passage of the Amendments, EPA began the Accidental Release Information Program (ARIP) to collect information on accidental releases, under section 104(e) of CERCLA and other information gathering authorities.

Other Reporting Requirements: CAA section 114 authority may be used for developing standards, determining compliance status of those standards, and in the implementation of any other CAA provisions. This section authorizes EPA to require the owner or operator of any emission source to keep records, make reports, monitor, sample emissions, and provide any other information as EPA may reasonably require; enter and inspect any premises where records are kept, copy records, inspect monitoring equipment and sampling emissions.

Chemical Safety and Hazard Investigation Board

The Chemical Safety and Hazard Investigation Board, authorized in the Clean Air Act §112(r)(6)(A)-(S), may investigate (or cause to be investigated) any accidental release resulting in a fatality, serious injury, or serious property damage. The Board may also establish accident reporting rules. After an investigation, the Board must determine and report to the public:

- The facts, conditions, and circumstances; and
- The cause or probable cause of any accidental release.

Toxic Substances Control Act (TSCA): Section 8(e)

What Must Be Reported: Must meet the criteria expressed by the statute.

Under TSCA 8(a), EPA may promulgate rules requiring manufacturers to keep records and make reports to EPA on chemical information such as categories of use, amounts produced, by-products, disposal methods, and the chemical's environmental and health effects. The final regulation implementing section 8(a) at 47 Federal Register 26992 requires reporting of production, release, and exposure data for 245 specific chemicals on the inventory list. EPA also issued a final inventory update 51 Federal Register 21438 under 8(a) to require manufacturers of chemicals on the inventory list to report current data on the production, volume, plant size, site-limited status of the substances. TSCA 7 addresses chemicals presenting an "imminent hazard" and allows EPA to suspend production of a chemical through the courts, an authority which has not been exercised.

Section 8(e) of TSCA requires the submission to EPA of information that reasonably supports the conclusion that a chemical substance or mixture presents a substantial risk of injury to health or the environment. A substantial risk of injury to health or the environment is a risk of considerable concern because of: (a) the seriousness of the effect, and (b) the fact or probability of its occurrence. This provision does not require EPA to act (either regulate or otherwise request) to get information.

Who Must Report, When and To Whom: Substantial risk information must be submitted immediately, (within fifteen days after a person receives information, except in the case of emergency incidents of environmental contamination, which must be reported by telephone as soon as a person subject to section 8(e) has knowledge of such information.) Section 8(e) applies only to:

- Persons or businesses engaged in manufacturing, processing, or distribution in commerce of chemical substances; and

- Information that is not already known to EPA, published in scientific literature, or submitted to EPA pursuant to mandatory reporting requirements under TSCA or any other EPA administered statutory authority, including notifications required under section 311 of the CWA. Information that corroborates well-established adverse effects is also not reportable.

The EPA interpretation of 8(e) was published in the Federal Register March 16, 1978. Revisions are being considered.

Resource Conservation and Recovery Act (RCRA) 3007(a), 3001 et seq.

Who Must Report, When and To Whom: Since all listed hazardous wastes under RCRA are CERCLA hazardous substances, they are subject to the CERCLA and EPCRA section 304 notification requirements. Treatment, storage and disposal facilities generally must follow the CERCLA and EPCRA 304 notification procedures for any release of a hazardous waste that could threaten health or the environment, even if the amount released is below the reportable quantity. If the release is below the RQ, however, notification may be made to the regional on-scene coordinator instead of the NRC.

Under 40 CFR section 264.196,tank treatment, storage and disposal facilities must notify the EPA regional office within 24 hours of any hazardous waste release unless the release is under one pound and immediately recovered or it has already been reported under CERCLA (40 CFR 302). Any leak or drop in the level of a surface impoundment must be reported by the owner or operator in the same manner as a tank leak 40 CFR 264.226. Small generators (those that generate between 100 and 1000 kilograms of hazardous waste per month) storing waste onsite are required to notify the NRC in the event of any release that threatens health outside the facility or reaches surface water, 40 CFR 262.34. In this case also, the amount of the release requiring notification may be less than the reportable quantity. Transporters of hazardous waste must immediately report releases to the National Response Center, 40 CFR 263.30.

Follow-up Reports: For transporter of hazardous wastes, under 40 CFR section 263.30,written follow-up reports must be submitted within 15 days to the EPA regional office. A written notice to EPA is also required within 15 days of any incident that necessitated implementation of a RCRA contingency plan developed under 40 CFR Part 264 and 265, Subpart D.

A written follow-up report to the EPA regional office regarding tank treatment, storage and disposal facility releases must be made within 30 days. Generators of 100 to 1000 kg of hazardous wastes per month are not required to provide a written follow up report.

Other Reporting Authorities: RCRA section 3007 provides EPA the authority to collect information from persons who handle or have handled hazardous waste, and to inspect any establishment or other place where hazardous wastes are generated, stored, treated, disposed of, or transported from and obtain records and other information and to obtain samples. This section has been used by EPA as partial authority to develop the ARIP program.

TRANSPORTATION STATUTES AND REGULATIONS FOR ACCIDENT REPORTING, AND OTHER RELEVANTINFORMATION COLLECTION AUTHORITIES

A number of different transportation and pipeline safety laws contain provisions for accident reporting, including reporting of hazardous materials transportation accidents. The following section identifies and describes the accident reporting requirements of transportation laws.

Hazardous Materials Transportation Act (HMTA)

Each of the DOT modal administrations keeps separate modal accident data and several agencies keep data that include minimal information on releases of hazardous materials. However, RSPA is the official DOT repository of hazardous materials release information. A transportation-related incident or release is defined in DOT regulations as any unintentional release of a hazardous material during transportation, or during loading/unloading or temporary storage related to transportation. Every release, except for those from bulk water transporters and solely intrastate motor carriers that do not transport hazardous substances and wastes and cryogenic liquids, must be reported to RSPA in writing as prescribed in 49 CFR 171.16,174.45 (rail), 175.45 (air), and 176.48 (marine vessels). The only other exceptions are consumer commodities that present a limited hazard during transportation, such as electric storage batteries and certain paints and materials. Notification of the NRC is required for those transportation releases that meet DOT's telephone reporting requirements, 49 CFR 171.15.

Who Must Report, When, and To Whom: Carriers are required to make an immediate telephone report to the National Response Center (NRC) when a spill has resulted in one or more of the following circumstances as a direct result of a hazardous material: a fatality; a serious injury requiring hospitalization; estimated carrier damage or other property damage exceeding $50,000;an evacuation of the public lasting one or more hours; the operational flight plan or routine of an aircraft is altered; fire, breakage, or suspected contamination involving shipment of radioactive materials or etiologic agents; or a situation of such a nature that the carrier judges that a report should be made even though it does not meet the reporting criteria. Notice involving etiological agents may be given to the Director, Center for Disease Control.

Follow-up Reports: A written response must be prepared by the carrier on DOT Form F5800.1,for all incidents for which a telephone notice was made. A written report is also required whenever there is any unintentional release of a hazardous material during transportation. This report must be submitted to RSPA within 30 days of discovery of the release.

Modal Transportation Authorities with Accident Reporting Provisions and Regulations

Independent of the RSPA release reporting system are several accident reporting systems maintained by various modal administrations. In this instance, the term accident refers to a vehicular accident. Other than human error, the most frequently cited cause of hazardous materials transportation incidents, most hazardous materials transport releases are not caused by vehicular accidents themselves, but instead are due to other causes such as faulty valves or closures. The accident reporting systems designed by the modal administrations typically cover all transportation accidents under the jurisdiction of the particular modal administration, not just those involving hazardous materials. In many cases, however special identifiers have been placed in the reporting format that permit designation of an accident involving hazardous materials. Accident reports required by the various modal administrations are usually based on reporting procedures independent of RSPA due to differences in statute, regulation and information needs. Following are brief synopses of the statutory language and regulatory approach taken by each of the modal administrations for accident reporting.

Office of Motor Carriers, formerly the Bureau of Motor Carrier Safety (BMCS)

The statutory and regulatory authority governing the accident reporting system for the Office of Motor Carriers is 49 U.S.C. App 2505; 49 U.S.C. 504 and 3102; and 49 CFR 1.48. Regulations describing accident reporting are included in 49 CFR 394. A reportable accident means an occurrence involving a commercial motor vehicle engaged in the interstate, foreign, or intrastate operations of a motor carrier, who is subject to the DOT Act, resulting in a fatality or injury requiring medical treatment away from the scene of the accident; or total damage to all property aggregating $4,400. The rules do not apply to farm-to-market agricultural transportation of an occurrence in the course of the operation of a passenger car by a motor carrier not transporting passengers for hire or hazardous materials that require placarding.

What Must Be Reported: Any motor carrier accident in which a fatality or injury occurred or for which at least $2,000 in property damage was incurred must be reported. Reports are filed on Form 50-T, which requests carrier identification and address, location of the incident, characteristics of the event, cause, information on the cargo, and consequences of the accident. The carrier identification, cargo description and certain accident characteristics are also recorded.

Who Must Report, When, and To Whom: Immediate notification (within 24 hours) by telephone or in person to the Director, Regional Office of Motor Carriers of the Federal Highway Administration Region in which the carrier's principal place of business is located is required if a fatality is involved. Within 30 days after the accident, a written report must be filed.

Federal Railroad Administration (FRA)

The statutory authority for railroad accident reporting was originally provided by the Accident Reports of 1910. This Act, was last amended by the Railroad Safety Act of 1970 and the FRA promulgated new accident reporting regulations in 1974. The statutory authority for railroad accident reporting is found in 45 U.S.C 38, 42, 43, and 43a, as amended; 45 U.S.C. 431, 437, and 438, as amended; Pub.L. 100-342; and 49 CFR 1.49 (c) and (m). The regulations are found in 49 CFR Part 225. The purpose of the regulations is to provide FRA with information concerning hazardous conditions on the nation's railroads. Issuance of these regulations preempts states from prescribing accident or incident reporting requirements, although states may require that railroads submit copies of the accident or incident reports filed with FRA. Telephonic reports are required whenever an accident or incident arising from the operation of the railroad results in the death of a rail passenger or employee or the death or injury of five or more persons.

Written reports must be submitted to FRA monthly. The criteria for submitting a report is:

- Any impact between railroad ontrack equipment and an automobile, bus, truck, motorcycle, bicycle, farm vehicle, or pedestrian at a rail-highway grade crossing;
- Any collision, derailment, fire, explosion, act of God, or other event involving operation of railroad ontrack equipment (standing or moving) that results in more than $6,300 in damages to railroad on-track equipment, signals, track, track structures, and roadbed;
- Any event arising from the operation of a railroad which results in death, injury to a non-railroad employee requiring medical treatment; injury to an employee requiring medical treatment or results in restriction of work or motion, one or more lost work days, transfer to another job, termination of employment, loss of consciousness, or occupational illness of a railroad employee as diagnosed by a physician.

Information is requested on the reporting form on derailed or damaged hazardous materials cars including whether the accident resulted in evacuation, explosion, fire, escape of hazardous materials and number evacuated.

National Highway Transportation Safety Administration (NHTSA)

NHTSA's Fatal Accident Reporting System (FARS) contains data on a census of fatal traffic crashes within the 50 States, the District of Columbia, and Puerto Rico. To be included in FARS, a crash must involve a motor vehicle travelling on a trafficway customarily open to the public and result in the death of a person (occupant of

a vehicle or a non-motorist) within 30 days of the crash. There is one question on the FARS reporting form involving hazardous materials -- "Hazardous Cargo - 0-no; 1-yes; 2-unknown.

Federal Aviation Administration (FAA)

FAA regulations (49 CFR 175.45) requires each operator who transports hazardous materials to report hazardous materials incidents telephonically and in writing using the same criteria established by RSPA, as does the Coast Guard (CG).

OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) REPORTING: 29 CFR Part 1910

OSHA has standards dealing with a substantial number of substances as "toxic and hazardous substances" in 29 CFR 1910.1000, that set forth limits for employee exposure to these substances.

Inspections and information gathering are covered by section 8 of the OSH Act, 29 USC 657. Employers must maintain accurate records and make them available to OSHA on request. OSHA is also authorized to prescribe regulations describing what records must be kept, including records about work-related deaths, injuries and illnesses, and exposure to potentially toxic materials.

Employers are also required to make available to employees their own records indicating exposure to toxic materials and, under certain OSHA standards applicable to toxic substances, to notify employees whenever they are exposed to toxic materials in excess of prescribed standards, and state what corrective actions are being taken. Employees will have access to their own records on exposure to toxic material or harmful physical agents.

OSHA has issued a number of individual occupational safety and health standards for various classes of hazardous substances. Typically, each standard includes reporting requirements, including the requirement that releases be reported to OSHA -- e.g., 29 CFR 1910.1003(f), 29 CFR 1910.1004(f), 29 CFR 1910.1006(f).

Employers must report any accidental release of a hazardous substance to OSHA when there has been a death or when five or more workers have been hospitalized. States with approved OSHA plans may have more stringent reporting requirements.

DOE Notification Procedures

The notification and reporting component of the Emergency Management System (EMS) is primarily implemented by two Orders: DOE Order 5000.3A and DOE Order 5500.2B. The notification and reporting process is supplemented by the Occurrence Reporting and Processing System (ORPS), an operational data base used to transmit, update, and approve occurrence reports required under DOE Order 5000.3A.

DOE Order 5000.3A establishes the comprehensive system for reporting information related to operations occurring at DOE-owned or operated facilities. As part of this system, DOE Order 5500.2B requires all DOE facilities to: (1) promptly and accurately categorize all occurrences; (2) determine the appropriate category and class of events categorized as emergencies; and (3) make appropriate notifications and reports.

The Order specifies the criteria for categorizing emergencies. All operational occurrences must be categorized within 2 hours of identification. Emergencies are continually monitored for the purpose of reclassification as they evolve towards increased or decreased severity. It should be noted that the emergency classes outlined in the Order 5000.2B have been expanded to include a reference standard for non-radiological releases as well as radiological releases. EPA has promulgated Protective Action Guides to which the exposure level resulting from releases of radiological material are compared to determine the appropriate emergency class. Because EPA has not promulgated exposure levels for releases of non-radiological material, this Order uses the Emergency Response Planning Guidelines (ERPGs) developed and approved by the American Industrial Hygiene Association in determining the appropriate emergency class for releases of non-radiological material. Generally comparable exposure levels (i.e., no irreversible health effects) is considered for both radiological and non-radiological hazards. Further guidance on use of ERPGs is being developed to assist in the implementation of this Order.

Internal DOE reporting requirements vary according to each category of operational occurrence, as follows:

- Off-Normal Occurrence. These are abnormal or unplanned events or conditions that could adversely affect the safety, security, environment, or health protection performance or operation of a facility. Facility managers must provide written notification to DOE within 24 hours of the occurrence.

- Unusual Occurrence. These are non-emergency occurrences that have a potential for significant impact on a facility's safety, environment, health, security, or operations (e.g., a release of radioactive or hazardous materials above established limits). Facility managers must verbally notify DOE as soon as possible, but no later than 2 hours after categorization, and must provide written notification within 24 hours.

- Emergency Occurrence. These include any actual or potential release of radioactive material or other material to the environment which could result in significant off-site consequences (e.g., need to relocate people, major wildlife kills, aquifer contamination, etc.). For emergency occurrences, facility managers must promptly notify state, tribal, local, and other federal agencies and must provide verbal notification to DOE within 15 minutes of emergency categorization. Written notification to DOE should be made as soon as practicable, but within 24 hours of emergency categorization.

Notifications are intended to promptly inform state, tribal, local, DOE, and other federal agencies of events categorized as emergencies. Additional notification requirements established in DOE Order 5500.2B include follow-up notification and communications between Field Elements and HQ Program Offices to meet the reporting requirements of other Orders (particularly DOE 5000.3A). Facility managers must make verbal follow-up notifications to DOE if any category of occurrence results in continued degradation in the level of safety at the facility or other worsening conditions, any change from one emergency action level to another, or if an emergency terminates. In addition, the DOE reporting requirements do not relieve DOE facilities from the notification and reporting requirements legally mandated by, or negotiated with, other federal, state, tribal, or local agencies. Specifically, the reporting requirements pursuant to CERCLA, RCRA, and EPCRA must be followed.

All notifications also must be made to DOE's Emergency Operations Center (EOC), which serves as the focal point for all emergency notifications and reports. The EOC receives, coordinates, and disseminates emergency information to HQ program elements and program office emergency points of contact, Congressional offices, the White House Situation Room, and other federal agencies.

The notification and response elements of the EMS are supplemented by the ORPS, which is an operational data base used by DOE contractor and Departmental Elements to transmit, update, and approve occurrence reports required under DOE Order 5000.3A.

CHAPTER 2. THE HISTORICAL DEVELOPMENT OF HAZARDOUS MATERIALS SAFETY POLICY

INTRODUCTION

Laws enacted to protect the worker, the public, and the environment from accidents resulting from the development, transportation, and use of hazardous materials have their origins in the mid- to late 1800s. These laws are inextricably woven into the fabric of American industrialization and have created what is today a complex system of prevention, preparedness, and response measures implemented by agents of federal, state, and local governments; industry; and the general public.

This chapter examines how U.S. hazardous materials safety policy evolved and how the various federal departments and agencies were delegated authorities. Events and public opinion trends that influenced policy development are also highlighted. While this review of hazardous materials safety policy development is not exhaustive, it outlines the history and examines whether historical patterns provide insights for streamlining and improving the safety system in place today.

The Evolution of Public Safety Laws for Hazardous Materials

A series of federal laws and regulations were developed and implemented to assign public responsibility for activities involving hazardous materials. Historically, these laws were designed to:

- Address safe transportation of hazardous materials;
- Address industrial safety and employee protection;
- Provide public and environmental protection from hazardous materials; and
- Address emergency management.

This chapter examines the evolution of transportation safety policy for hazardous materials. Safety laws were first enacted to address a significant casualty problem in the railroad industry at the turn of the century. These laws signalled increased attention to safety as American industrialization advanced, and established the basis for future hazardous material transportation safety policies.

The chapter also reviews the development of hazardous material safety policies regulating industry, particularly those policies affecting worker safety. As new technologies, materials, and manufacturing procedures were developed, the need to examine and develop safe practices and tools for using those technologies and materials began to emerge, giving rise to the industrial safety movement.

Finally, the chapter reviews the evolution of environmental laws and the role accidents have played in the development of these laws, and examines selected portions of the history of safety policies developed for radioactive materials and for emergency management.

HAZARDOUS MATERIALS TRANSPORTATION SAFETY

Federal involvement in hazardous materials transportation safety first resulted from concerns about the transport of explosives and flammable materials such as nitroglycerin and glynoin oil in the mid-1800s. In 1887, with the creation of the Interstate Commerce Commission (ICC), economic, technological, and safety regulatory functions for the railroads were placed under ICC jurisdiction. Liability in the rail industry was also an issue at the time. The first workman's compensation law enacted was the Federal Employer's Liability Act of 1908, designed to protect rail employees injured at work.

From 1893 to 1921, a series of safety statutes were added to the ICC's regulatory responsibilities. One of these initial safety statutes, the Explosives and Combustibles Act of 1908, addressed hazardous materials transportation safety and placed the authorities vested by the Act with the ICC. Other of these early safety measures focused on such subjects as new safety appliances, improvements in signal systems, and a reduction in the work hours. The 1908 statute was the hallmark for hazardous materials transportation safety for the next six decades. A 1921 amendment to the Hazards and Combustibles Act allowed the ICC to use technical assistance from the Association of American Railroads' Bureau of Explosives, founded in 1905. The initial ICC regulations covered packing, marking, loading, and handling of explosives and other dangerous substances in transit, and prescribed penalties for shippers and carriers who violated those regulations.

As the trucking and airline industries developed, and as rail and water transportation were modernized, new government institutions were created during the mid 1900s. The roles and relationships between government and non-governmental technical experts grew. In the early 1900s, the U.S. Coast Guard (USCG) was required to adopt ICC regulations for classification of hazardous materials and for marking, labeling, packing, and certification of portable containers. Other laws administered by the USCG, such as the Tank Vessel Act and the Dangerous Cargo Act, were enacted in the 1930s and 1940s.

Regulatory authority for the trucking industry also was vested in the ICC in the 1930s. The Civil Aeronautics Authority, later the Civil Aeronautics Board (CAB), was created in 1938. Within the Department of Commerce, the CAB developed the first regulations for transportation of hazardous materials by air in the early 1940s. The CAB, like the Coast Guard, developed its regulations through the wholesale adoption of ICC hazardous materials rules. The Federal Aviation Administration (FAA), established in 1958, later assumed the non-economic regulatory authority of the CAB, including its hazardous materials safety regulations. Figure 2-1 provides a chronology of the early history of hazardous materials transportation safety policy.

A major shift in transportation policy occurred when Congress created the Department of Transportation in 1966. The new department was responsible for the development of transportation infrastructure and transportation safety, including hazardous materials transportation safety. The modal administrations, including rail, aviation, highway, pipeline, and the U.S. Coast Guard (for civilian activities) were housed under DOT. The DOT statute also established the National Transportation Safety Board (NTSB) to conduct independent accident investigations and to recommend safety improvements. Economic regulatory functions for truck and rail transportation industries were retained by the ICC and by other regulatory bodies for other transport modes.

Under the new DOT organization, regulations for each transport mode were published in different parts of the Code of Federal Regulations (CFR). The Hazardous Materials Transportation Regulations Board was created to coordinate all DOT hazardous materials activities. The Board expanded the hazard classes to be covered by the regulations, (e.g., corrosive solids were added in 1974). However, because each modal institution had independent authority to regulate hazardous material transportation safety in its mode, every modal administration had to consider and approve any proposed changes in the hazardous materials regulatory system put forth by the Board. The result was a cumbersome and unworkable system for developing coherent hazardous materials transportation policy.

DOT proposed changes in its statutory authority for hazardous materials transportation regulations in 1970 — changes which were intended to consolidate and transfer authority for hazardous materials safety to the Hazardous Materials Regulations Board. While modest changes were enacted, the resources required to implement the changes were not appropriated, and the Department was unable to implement the law.

The investigation of the 1973 crash at Logan International Airport (Boston) of a 707 cargo jet carrying hazardous materials revealed a general lack of compliance by the airline industry with existing airline requirements. NTSB attributed responsibility in part to fragmentation of regulatory authorities, complex regulations, a lack of industry familiarity with federal regulations, and inadequate government

Figure 2-1: Hazardous Materials —Early Transport Safety Chronology

YEAR	STATUTE	INSTITUTION	REGULATION/OTHER ACTION
1866	First federal law regulating hazardous material transport of explosives/flammables.		
1871	Law establishing criminal sanctions against persons transporting specific hazardous commodities on passenger vessels in U.S. waters.	Department of Treasury	
1887		Interstate Commerce Commission (ICC) established.	Regulated interstate commerce and safety for railroads.
1897	Rivers and Harbors Act		Prohibited obstructions in navigable waters.
1899	Refuse Act	Army Corps of Engineers	Prohibited discharge, deposit, or other action which would cause obstruction to navigable waters.
1908	Explosives & Combustibles Act (later Explosives and Other Dangerous Articles Act)	ICC	Governed hazardous material transport for six decades.
1911			ICC regulated packing, marking, loading, handling of explosive & other dangerous goods; criminal penalties for shippers who violated regulations.
1921	Explosives and Combustibles Act Amendments	ICC	Allowed the ICC to use technical expertise of the Bureau of Explosives, Division of the Association of American Railroads.
1930s		ICC	ICC regulations adopted on a case-by-case basis in response to specific industry initiations; also hazardous material list expanded; and regulated shippers expanded to include highway.
1936	Tank Vessel Act; and International Convention for Safety of Life at Sea.	USCG	Adopted ICC regulations for classification of hazardous material, marking labeling, packing and certification of portable containers.
1938	Civil Aeronautics Act	Civil Aeronautics Authority	Created the CAA (later the CAB) to regulate air carriers and safety.
Early 1940s		Civil Aeronautics Board (CAB)	CAB, in conjunction with the Department of Commerce safety officials, developed first hazardous material transport regulations for air shipments.
1940	Dangerous Cargo Act	USCG	Applied ICC regulations to vessels carrying dangerous cargoes.

surveillance. These findings echoed conclusions of several major studies of hazardous material transportationsafety conducted by various government agencies. The crash galvanized concern about the limitations of the federal regulatory structure for transportation, leading to the enactment of the Hazardous Materials Transportation Act of 1975.

The Hazardous Materials Transportation Act (HMTA)

The intent of the Hazardous Materials Transportation Act (HMTA) was to strengthen regulatory and enforcement activities by providing the Secretary of Transportation with broad authority to set regulations for all modes of transportation. Specifically, the HMTA:

- Authorized DOT to issue regulations related to placarding, handling, packing, repacking, marking, routing, and labeling;
- Expanded the regulated community to include container manufacturers;
- Authorized establishment of a shipper registration program;
- Provided DOT the authority to conduct surveillance activities and assess penalties; and
- Defined the relationship between federal, state, and local government regulations.

This Act also separated the National Transportation Safety Board from the DOT structure, making it an independent body reporting directly to the Congress.

After the passage of HMTA, the DOT Secretary created the Materials Transportation Bureau (MTB) within the Research and Special Programs Administration (RSPA) in 1977. The MTB was delegated responsibility for issuing umbrella hazardous materials transportation regulations except those governing bulk transport by water, which remained the responsibility of the Coast Guard. The modal administrations continued to be responsible for modal safety regulations and for developing specific hazardous materials regulations applicable to each transport mode. Inspection and enforcement authority was divided among MTB and the modal administrations. Each modal administration conducted hazardous materials inspections in addition to specific modal safety inspections, and the MTB maintained a small force of hazardous materials inspectors to conduct multi-modal inspections and inspections of container manufacturers and retesters.

In 1976, MTB consolidated and amended the hazardous materials regulations based on changes originally proposed prior to the passage of the HMTA. FAA and part of the Coast Guard regulations were consolidated into 49 CFR, which already contained the rail and highway hazardous materials regulations. In addition, the hazard class of "Other Regulated Materials" with four subclasses was added to the DOT classification system to include materials that were encompassed in hazard classifications used by the FAA and the Coast Guard prior to consolidation of the regulations. A fifth subclass of "Other Regulated Materials" was added in 1980 as a result of the hazardous substances list required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

In 1985, DOT's Research and Special Programs Administration reorganized. The Materials Transportation Bureau was abolished and its responsibilities were transferred to the Office of Pipeline Safety and the Office of Hazardous Materials Transportation, now called the Office of Hazardous Materials Safety within RSPA.

Since 1953, the United States has participated in the United Nations Committee of Experts on the Transport of Dangerous Goods. Provisions related to harmonization of U.S. hazardous materials transportation policies in international arenas have been included in both the Hazardous Materials Transportation Act of 1975 and the more recent Hazardous Materials Transportation Uniform Safety Act of 1990, discussed below.

Hazardous Materials Transportation Uniform Safety Act

The statutory authority for hazardous materials transportation safety remained essentially unchanged until 1990 when Congress enacted the Hazardous Materials Transportation Uniform Safety Act (HMTUSA). This act required DOT to issue rules to:

- Regulate hazardous materials transport in intrastate commerce;
- Create shipping manifests;
- Regulate training for handlers of hazardous materials;
- Require certain hazardous materials carriers to hold safety permits;
- Issue procedures and waivers for preemptions;
- Develop and implement a grant program for local emergency planning and first responder training, and develop a national curriculum;
- Improve hazardous materials identification systems;
- Determine the cost-benefits of a continually monitored emergency response telephone system; and
- Require certain shipper and carrier registration fees.

HMTUSA also required a number of different studies to be conducted by DOT and other organizations. In addition, HMTUSA amended HMTA to require the Secretary of Transportation to participate in international forums that establish or recommend mandatory standards and requirements for the transportation of hazardous materials in international commerce. In fact, DOT participates in five international organizations with responsibility for international transportation standards uniformity.

Other recent requirements have been proposed or finalized by DOT. RSPA adopted new requirements for cargo tanks used to transport hazardous materials. This is the first comprehensive revision of cargo tank regulations in over 20 years and is a significant safety initiative. In addition, RSPA made major changes to hazardous materials classification, hazard communication, packaging, and handling requirements, which included many safety improvements, simplified the regulations, and brought U.S. regulations into harmony with international regulations, essential to enabling U.S. industries to maintain leadership in the global marketplace.

Figure 2-2: Hazardous Materials —1950s-Present Transport Safety Chronology

YEAR	STATUTE	INSTITUTION	REGULATION/OTHER ACTION
1958	Federal Aviation Act	Federal Aviation Administration (FAA) established.	FAA assumed non-economic regulatory functions of the CAB; contained penalties and provisions for violations of hazardous material regulations.
1960	Congress extended ICC ability to use professional technical services of outside organizations.	ICC	Tank Car Committee of the Association of American Railroads (AAR) given authority to approve applications submitted to ICC for tank car design/construction alterations.

YEAR	STATUTE	INSTITUTION	REGULATION/OTHER ACTION
1960	Explosives and Other Dangerous Articles Act	DOT/AEC/DOD	Shipments of radioactive materials required certain safeguards under supervision of AEC/DOD - law attempted to balance national security concerns. DOT consulted with AEC before adopting regulations concerning radioactive material transport. Revised and updated 1908 law to include controls of transport of radioactive materials and etiologic agents, poisons not previously included; also extended transport coverage to private and contract carriers, as an addition to the already regulated common carriers.
1966	Department of Transportation Act	Department of Transportation (DOT) formed	Each modal administration retained safety authority including hazardous material safety. Transferred regulatory authority for hazardous material transport from ICC, CAB, and Treasury into DOT, among other things. Economic regulatory functions remained with original agencies; National Transportation Safety Board (NTSB) formed.
1968		DOT creates Hazardous Materials Board	Internal DOT organization to develop hazardous material regulations which, by law, had to be approved by modal administrations.
1968	Natural Gas Pipeline Safety Act	DOT	
1970	Federal Railroad Safety Act and the Hazardous Materials Transportation Control Act of 1970	DOT	DOT sought to consolidate regulatory requirements and authority; additional requirements on hazardous material transport enacted. Failure to appropriate funds resulted in inability of DOT to implement statute.
1972	Federal Water Pollution Control Act	USCG/EPA	Gave authority to prohibit pollution to waterways and enforce this prohibition; and established national response system.
1972	Ports and Waterways Safety Act	USCG	Authorized regulation regarding movement, inspection, etc., of vessels, harbors, ports, etc.
1975	Hazardous Materials Transportation Act	DOT	DOT, Materials Transportation Bureau obtains umbrella authority for hazardous materials transport policy. Expanded DOT hazardous material jurisdiction, including hazardous material classifications, regulations regarding labelling etc., shipper registration program authorized; codified exemptions; expanded surveillance authority; civil/criminal penalties; defined federal/state/local relationship; separated NTSB from DOT.
1976		DOT	Partial consolidation of FAA and USCG regulations into 49 CFR with rail and highway; amendments to existing requirements; addition of new hazard classes; left bulk water shipments in 46 CFR.

YEAR	STATUTE	INSTITUTION	REGULATION/OTHER ACTION
1978		DOT/Bureau of Motor Carrier Safety (BMCS)	Motor carrier safety regulations incorporated by reference into MTB/RSPA regulations.
1978	Ports and Waterways Safety Act as amended by the Port and Harbors Safety Act of 1978	USCG	Authorized USCG to regulate bulk shipments of flammables or combustible liquid materials by vessel.
1979	The Hazardous Liquid Pipeline Safety Act	DOT	
1980	Motor Carrier Safety Act	DOT/BMCS	The Motor Carrier Safety Act primarily addresses deregulation. However, because of safety concerns, it required DOT to establish minimal levels of financial responsibility sufficient to satisfy liability amounts covering public liability, property damage, and environmental restoration for hazardous materials transportation by motor vehicles in interstate and intrastate commerce.
1981		DOT/MTB	HM-164, routing rule for radioactive materials, providing guidance to state/local governments and requires preferred routes for high level materials and minimization of risks for low-level radioactive materials transport.
1982	Surface Transportation Assistance Act	DOT/Bureau of Motor Carrier Safety	Motor Carrier Safety Assistance Program (MCSAP) 5 year enforcement training program for states.
1990	Hazardous Materials Transportation Uniform Safety Act (HMTUSA)	DOT/Office of Hazardous Materials Safety	Expands DOT responsibilities for hazardous materials and mandates, for the first time, an Emergency Preparedness Grant Program funded by registration fees to provide funds to states and Indian tribes for emergency planning and training.
1990	Oil Pollution Act	EPA/DOT-USCG/RSPA	Added significant prevention and response programs for oil pollution.

Several other laws enacted in the 1970s had significant effects on Coast Guard capabilities to prevent and prepare for hazardous materials accidents. The first, the Federal Water Pollution Control Act of 1972, gave the Coast Guard and the Environmental Protection Agency authority to prevent and respond to accidental releases in and pollution of navigable waters. The 1978 Port and Tanker Safety Act, which amended the earlier Ports and Waterways Safety Act, gave the Coast Guard authority to establish, maintain, and operate vessel traffic services; allowed Port Captains to regulate movement in ports; and required vessels to comply with vessel traffic systems. In 1990, the enactment of the Oil Pollution Act added significantly to prevention measures for oil spills and to contingency planning and response to such spills.

FINDINGS

From the late 1800s to the present, the development of hazardous materials transportation policy indicates the following:

- The initial regulations for hazardous materials transportation safety established regulatory concepts which still exist and have been expanded. These regulations:

- Began the system for classifying the hazards being transported, with a focus on materials likely to cause immediate injury to carrier personnel and the public if unexpectedly released during transport; and

- Focused the regulatory approach on the prevention and mitigation of accidents via the development of standards for packaging, containerization, labeling of the package or container, and the loading and unloading of hazardous materials.

- With the development of new transportation technologies, new government institutions were created to regulate new modes. Hazardous materials safety regulations were placed within the purview of these modal institutions.

- Beginning in the late 1800s, safety authority for hazardous materials transport was vested in the ICC, which also had primary federal responsibility for economic regulation and promotion of interstate rail and truck commerce. Other institutions created for differing modes of transportation were required to adopt ICC hazardous materials safety regulations and also developed their own regulations as well.

- The absence of federal technical expertise to develop hazardous materials safety regulations and the existence of both safety and economic regulatory functions housed together within the ICC necessitated an early cooperative, industry-government relationship in the development of safety regulations.

- With the Interstate Commerce Commission, transportation policy was focused on economic, technological, and safety measures. Interstate commerce policies encouraged the development of standardized transportation technology; established federal preemption of state laws in the development of interstate transportation policy, including safety; and promoted further development of the transport sector.

- The creation of DOT in 1966 and the subsequent passage of the Hazardous Materials Transportation Act of 1975 served to consolidate hazardous materials regulatory responsibility in a centralized body and expanded regulatory authority.

- The passage of the Hazardous Materials Transportation Uniform Safety Act of 1990 clarified certain authorities originally granted under HMTA, and authorized specific, additional hazardous materials transportation regulations and programs. It did not change the essential management structure established by HMTA.

- The primary role of the federal government in the development and implementation of hazardous materials transportation safety policy has been toward preventing accidents through regulatory measures for containers, packaging, labeling, and handling, etc., and, if an accident occurs, having a system whereby the hazardous material could be easily identified by first responder. Recent legislation has added a number of measures; among them, a planning grant and training program for first responders to the accident or incident.

HAZARDOUS MATERIALS—WORKER AND INDUSTRIAL SAFETY

Concurrent with the early development of transportation safety was the emergence of the industrial safety movement at the turn of the century. In the 19th century, the safety of an employee was generally considered to be the individual worker's own responsibility. Common law doctrines, such as the "assumption of risk" doctrine, stated that by accepting employment, the worker assumed any risks connected with it. The doctrine of "contributory negligence" absolved the employer from responsibility for injuries resulting from accidents if the employee had contributed to the cause in any degree.

Although the initial stimulus for the industrial safety movement was public concern over industries with high rates of severe injury and fatality, significant advances in industrial safety did not occur until industry became aware that accidents interrupted production and raised operating costs. As indicated, the first workers' compensation law was designed to protect rail employees injured by work-related accidents. Other workers' compensation laws were then enacted, giving impetus to the development of the industrial safety movement. Inherent in these laws was the concept that the employer is responsible for injuries incurred at work, even if they cannot be attributed to any one person or cause. Thus industry became legally liable for injuries to workers and obligated to provide benefits. Management therefore had a strong economic incentive for preventing accidents, and casualty insurance became a means of protecting the employer. Insurance companies worked with industry and played a major role in accident prevention, developing methods for evaluating risks, and aiding employers in taking preventive actions. During the twentieth century, a series of laws was enacted and institutions created that have addressed industrial safety and hygiene and have directly and indirectly shaped hazardous materials safety for the worker.[1]

Specific federal government concerns for providing worker protection from hazardous materials essentially began in 1970 with the creation of the Occupational Safety and Health Administration (OSHA) within the Department of Labor. The Occupational Safety and Health Act of 1970 (the Act), the primary legislation that has shaped the current policy for worker protection, was designed to assure "so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources." The Act also established the National Institute for Occupational Safety and Health (NIOSH) within the Department of Health and Human Services (HHS) to conduct research into the causes of occupational injuries and illnesses and approaches for dealing with occupational safety and health problems. In addition, the Act encourages states to conduct their own federally approved job safety and health programs, which are required to be at least as effective as the federal program.

OSHA initially addressed worker and workplace hazardous materials safety in 1972 with the adoption of industry consensus standards (Subpart H of OSHA's regulations, 29 CFR Part 1910). Unlike other industrial hazards in which safety engineering practices can be studied and standardized for a given industry, hazardous materials development, production, storage, transportation, use, and disposal are undertaken by a host of workers at the different stages in the life cycle of the materials. If not employed in an actual chemical manufacturing facility, many of the workers who would be charged with handling, delivering, using, or disposing of hazardous materials in all likelihood would have little or no technical knowledge of or direct experience with the materials they handle. OSHA responded to this lack of workers' knowledge about chemical hazards and the resultant concern for their safety by establishing a system for identifying and communicating the hazards to which any worker might be exposed during the life cycle of a chemical.

Adopted in 1983, and expanded in 1987, the Hazard Communication Standard (HCS) was designed to provide information on the hazards to which any workers might be exposed. The standard requires information to be prepared and transmitted regarding all hazardous chemicals. HCS covers both the physical hazards (e.g., flammability, etc.) and the health hazards (e.g., lung damage, cancer, etc.). Most chemicals used in the workplace have some hazard potential which is covered by the rule.

The HCS established requirements to ensure that the hazards of all chemicals imported into, produced, or used in the U.S. workplaces are evaluated, and that the information obtained from the evaluations is transmitted to the affected employers and potentially exposed employees. Chemical manufacturers and importers must prepare labels for containers, and more detailed technical bulletins called "Material Safety Data Sheets (MSDS)" to accompany regulated chemicals at any point during the life of the product. Employers must make labels and MSDSs available to workers and provide training.

When Congress passed SARA in 1986, Title III, the Emergency Planning and Community Right-to-Know Act, laid the foundation for each community or state-designated district to develop an emergency

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[1] Information taken from an article on Industrial Safety developed for the Encyclopedia Britannica.

response plan to help communities respond effectively to emergency incidents involving hazardous substances. SARA Title III also placed requirements on employers to assist in the planning process and to provide accurate information about the hazardous substances or chemicals they control.

In March 1989, OSHA promulgated a final rule on Hazardous Waste Operations and Emergency Response (HAZWOPER). The rule was issued under OSH Act and SARA Title I, Provisions Relating Primarily to Response and Liability, Section 126, Worker Protection Standards, and was designed to work "hand-in-hand" with SARA Title III. HAZWOPER covers workers employed in cleanup operations at uncontrolled hazardous waste sites and at EPA-licensed waste treatment, storage, and disposal facilities, as well as workers responding to all emergencies, including those involving hazardous materials (e.g., spills). These regulations include establishing health and safety programs; conducting site characterization and site control; training, medical surveillance; engineering controls and work practices; personal protective equipment; air monitoring; and decontamination. In June of 1989, EPA adopted an identical rule to cover state and local government employees in non-OSHA plan states.

In the Clean Air Act Amendments (CAAA) of 1990[2], Congress required that OSHA promulgate a chemical process safety standard to prevent accidental releases of chemicals which could pose a threat to employees. The CAAA also required that the standard include a list of highly hazardous chemicals which include toxic, flammable, highly reactive and explosive substances. Covered substances include manufacture of explosives and pyrotechnics, flammable liquids and gases, and certain toxics and reactive materials found in Appendix A of the standard. The Process Safety Management (PSM) Standard, promulgated in February 1992, includes requirements for employers to develop procedures and practices to fully control substances in order to prevent, to the extent possible, large accidental releases that could result in catastrophes.

FINDINGS

Several findings on the development of hazardous materials safety can be made from the general history of industrial safety in the United States. These include:

- The introduction of workers' compensation laws at the beginning of the twentieth century placed accident liability on management, thus creating an economic incentive for accident prevention and industrial safety programs.

- Primary regulatory focus for occupational safety and health for industries producing or using hazardous materials has been directed toward:

  - A system to identify and classify hazards;

  - The development of a system wherein workers in any segment of the life cycle of a hazardous material would be informed of the materials they were dealing with and trained in safe handling practices;

  - The training of persons responsible for emergency response or hazardous waste clean-up; and

  - The development of industry process safety systems that require application of hazard analysis and evaluation of plants and facilities producing or using hazardous materials.

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[2] P.L. 101-549.

HAZARDOUS MATERIALS ENVIRONMENTAL SAFETY

Industrialization in the 1800s began to reshape the character of the American landscape, resulting in the development of the American conservation movement. A century later, ideas put forth by the early conservationists were embraced and expanded to create what is today the modern environmental movement. The movement's primary focus —to stem the long term consequences of near term environmental degradation —contributed to public education about the immediate dangers from hazardous materials accidents.

Just as the American public accepted, consumed, and possibly even took for granted the benefits of the modern chemical age during the pre- and post-World War II era, beginning in the 1960s, the public became increasingly wary of the risks, both real and perceived, associated with hazardous materials. The majority of statutory provisions for hazardous materials accident prevention, preparedness, and response became law within the last two decades.

The general growth of public concern about the environment in the late 1960s and early 1970s, as well as several large oil spills and hazardous material accidents during the decades of the 60s, 70s, and 80s, led to the enactment of an unprecedented number of environmental laws and regulations. Accidents involving hazardous materials have played a significant role in the development of public safety policy. Accidents have, more often than not, served as the catalysts for laws directed at public, worker, and environmental safety, and for broader environmental protection policy in general. This is not to say that prior to these accidents no efforts had been made at the federal level. However, these accidents sometimes created the "window of opportunity" for legislation on safety issues to rapidly emerge onto the national agenda. Figure 2-3 gives a chronology of major accidents that have served as catalysts for legislative and programmatic actions.

Figure 2-3: Chronology of Major Accidents/Incidents in Relation to Major Statutes/Regulations

INCIDENTS		LAWS AND REGULATIONS	
1967	Torrey Canyon oil tanker spills over 100,000tons of oil that eventually wash ashore on English and French beaches.	1968	The first National Contingency Plan is drafted.
1968	Santa Barbara Channel oil spill	1972	Federal Water Pollution Control Act (FWPCA) Amendments require promulgation of the National Multiagency Oil and Hazardous Materials Contingency Plan (NCP) under the FWPCA.
		1973	NCP is promulgated, establishing National Response System including interagency National and Regional Response Teams to minimize damage done by accidental spills and releases.
1970s	Chlorinated organic compounds are found to be contaminating major surface and underground supplies of drinking water, and widespread underground injection operations are found to be contaminating the huge Edwards aquifer which supplies much of Texas' drinking water.	1974	The Safe Drinking Water Act (SDWA) required EPA to develop national maximum contaminant levels for drinking water, and authorized EPA to take necessary action if there is danger to public health.
1973	Cargo plane with hazardous materials crashes in Boston.	1975	HMTA gives enforcement authority that was formerly shared by DOT, FAA and USCG to DOT.

INCIDENTS		LAWS AND REGULATIONS	
1975	Workers exposed to vinyl chloride monomer (VCM) develop a rare form of cancer, angiosarcoma of the liver.	1976	The Toxic Substances Control Act (TSCA) gives EPA the authority to test and regulate chemicals if they present unreasonable risk of injury to health or the environment; establishes system to identify chemicals new/proposed for commercial use.
1975	Workers exposed to the chemical Kepone in a small Virginia manufacturing plant suffer from severe neurological and reproductive damage.	1976	The Resource Conservation and Recovery Act amends the Solid Waste Disposal Act, and gives EPA authority to regulate hazardous waste and enjoin activities involving solid waste that present imminent and substantial endangerment to health and the environment.
1976	Argo Merchant oil spill, Massachusetts Coast	1977	Amendments to the National Contingency Plan and Federal Water Pollution Control Act
1978	Love Canal and Valley of the Drums hazardous waste sites are found to be contaminating soil and ground water.	1980	Superfund (CERCLA) gives the federal government the funding and explicit authority to clean up first and get reimbursed later, and to respond to releases to all environmental media, not just navigable waters. Disaster Relief Act funds applied to Love Canal evacuees.
1979	Three Mile Island accident	1980	Kemeny Commission reports need for improved emergency preparedness by federal, state, and local governments and utilities. Prompts development of Federal Radiological Emergency Response Plan.
1982	Times Beach, MO dioxin release	1986	Title III of Superfund Amendments and Reauthorization Act (SARA), also known as the Emergency Planning and Community Right-to-know Act (EPCRA), requires emergency release notification and state and local emergency planning.
1984	Release of methyl isocyanate in Bhopal, India, kills over 2,500 people.		
1985	Release of aldicarb oxime occurs in Institute, WV.		
1986	Kerr McGee hydrogen fluoride release, Oklahoma		
1986	Chernobyl, USSR nuclear reactor explosion.	1987	Triggers reexamination of emergency medical services, response, and training for nuclear accidents. Ongoing revisions to Federal Radiological and Emergency Response Plan (FRERP) reflect lessons learned.
1988	Ashland, PA oil spill	1990	Oil Pollution Act requires additional prevention and emergency preparedness measures.
1989	Exxon Valdez oil tanker rupture floods fragile ecosystem in Prince William Sound, AK, with over ten million gallons of oil.		
1989	Explosion occurs at Phillips 66 Company in Pasadena, TX.	1990	Clean Air Act Amendments require EPA to promulgate regulations requiring plants, using EPA-listed regulated substances, to develop risk management plans, and require OSHA to promulgate regulations on process safety management standards for facilities using OSHA-defined highly hazardous chemicals (EPA regulations currently under review; OSHA regulations promulgated 1992).
1990	Explosion occurs at Arco chemical plant.		

With the exception of the agencies created to manage federal lands and agricultural programs in the late 1800s and first half of the 1900s, most governmental responsibility for the environment, and related matters such as waste disposal, was predominantly within the purview of the states. Federal institutions established in the 1800s have played and continue to play a significant role in the development of hazardous material safety policy. In 1849, the Department of the Interior (DOI) was established to manage nationally-owned lands and natural resources. It was the first federal agency charged with responding to hazardous material emergencies. In 1862, the Department of Agriculture was established; its responsibilities included research on pesticides. In 1897, the Rivers and Harbors Act was enacted to eliminate impediments to navigation, and the Refuse Act of 1899, administered by the Army Corps of Engineers, covered almost all discharges to navigable waters. Because oil and petroleum-based products were among the first hazardous materials to be widely produced and used, these products were among the first addressed by government safety and environmental statutes. The Oil Pollution Act of 1924 gave the Department of Interior access to Department of Defense and Coast Guard resources to clean up spills.

After World War II, the federal government slowly became more involved with legislation related to the environment. In 1948, the Federal Water Pollution Control Act was passed to address waste disposal problems. In 1956, the Water Pollution Control Act authorized the first federal money for water treatment plants. And in 1965, the Water Quality Act gave the federal government power to set water standards in the absence of state action for certain waters.

Two air pollution incidents increased the public's awareness of growing environmental problems: the first was in 1948 in Donora, Pennsylvania, where 20 people were killed and 14,000 became ill from local air pollution remaining close to the ground due to an atmospheric inversion; the second incident happened in 1966 in New York City, where 80 people died from a 4-day air pollution atmospheric inversion. The first Clean Air Act, passed in 1963, authorized $95 million to local, state, and national air pollution programs.

During the 1960s, increasing public awareness of the dangers of chemicals such as DDT, the publication of books such as Rachel Carson's Silent Spring, media revelations about chemical warfare agents being used in Vietnam, and a growing nuclear disarmament movement gave increased impetus to concern for the environment. These factors also led to a growing distrust of the chemical and nuclear industries among some of the American population.

In 1967, a tanker called the *Torrey Canyon* ran aground off the coast of England, spilling 35 to 38 million gallons of oil. This accident once again called attention to environmental damage caused by accidents, and, as a result, President Johnson ordered the Departments of the Interior and Transportation to study the nation's capabilities for handling such disasters. The resulting report indicated the need for public sector action. In June 1968, the President assigned the responsibility for oil spill emergencies to the Secretaries of Interior, Defense, Transportation, and the Office of Science and Technology. The Secretary of the Interior was directed to take the lead in creating a multi-agency contingency plan for responding to such emergencies.

In September 1968, the National Multiagency Oil and Hazardous Materials Contingency Plan — commonly referred to as the National Contingency Plan (NCP) — was completed and signed by DOI; DOD; DOT; Health, Education, and Welfare (HEW); and the Office of Emergency Planning, a predecessor agency to FEMA. The NCP assigned responsibilities for emergency responses to the signatory agencies and established a national response system comprised of a hierarchy of coordinating bodies and designated federal on-scene responders.

This response system was initially operated under a number of existing legal authorities available to the signatory agencies including the Oil Pollution Act of 1924, (as amended), the Disaster Relief Act of 1966, the Refuse Act of 1899, the Federal Water Pollution Control Act (as amended), and the Outer Continental Shelf Lands Act.

In 1970, the passage of the National Environmental Policy Act, administered by the President's Council on Environmental Quality, was the first in a series of statutes enacted in the next two decades that shaped the environmental policy, including safety-related measures that we have today.

The Environmental Protection Agency (EPA), created by Executive Order in 1970, consolidated a number of environmental functions from other departments and agencies. The principal roles and functions of the EPA were to:

- Establish and enforce environmental protection standards;
- Conduct research on the effects of pollution and methods for controlling it;
- Conduct information gathering for proposing pollution related policy changes;
- Assist others through grants and technical assistance in arresting pollution; and,
- Assist the Council on Environmental Quality in developing and recommending new environmental protection policies.

These authorities form the basis of many programs that EPA administers today. A number of the offices and programs included in the reorganization had, or were later vested with, authorities used to develop hazardous materials safety policy.

Also in 1970, by Executive Order, another reorganization established the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce.

RECENT ENVIRONMENTAL LEGISLATION

In addition to the development of a national environmental policy and the creation of EPA, several specific pieces of environmental legislation were enacted in 1970, including amendments to the Clean Air Act and the Water Quality Improvement Act. The 1970 Clean Air Act amendments strengthened anti-pollution laws. The Water Quality Improvement Act of 1970 revised the Federal Water Pollution Control Act, including a significant number of pollution related measures, as well as requiring revisions to the NCP. The Act also created a regulatory structure that included penalties for oil spills and for failure to notify the government; it required the designation of a list of "hazardous substances;" it required notification of hazardous substance spills; and it authorized federal clean-up through the section 311(k) trust fund. Responsibility for the NCP was initially delegated to the Council on Environmental Quality.

The National Contingency Plan revisions resulted in the creation of the National Response Team and the National Response Center, replacing previous coordination bodies. The NCP was revised again in 1971 to include new member agencies. Among them was the EPA, which assumed the Chairmanship of the National Response Team from the Department of the Interior, while the Coast Guard maintained its vice-chair position. The Departments of Commerce, HEW, Justice, and State and the Office of Emergency Planning became advisory agencies. The addition of the Atomic Energy Commission to the National Response Team came from the 1972 amendments to the Federal Water Pollution Control Act. The 1972 Amendments were the impetus for increasing U.S. emergency response capabilities for oil spills into navigable waters[3], and for requiring improvements in and compliance with pollution control.

The 1972 Amendments to the Federal Water Pollution Control Act (also referred to as the Clean Water Act) created, among other provisions, a federal permitting and enforcement program for industrial, commercial, federal, and municipal sources discharging pollutants into waters of the United States, controls

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[3] "Navigable waters" were interpreted to include land or air releases which could reach navigable waters. This effectively broadened the scope to almost all areas of the U.S.

on industries discharging into municipal sewer system, national effluent standards to be met, and dates for compliance with standards. These programs deal with all pollutants discharged and do not focus exclusively on hazardous substances. The legislation also enables EPA to sue any person causing or contributing to an imminent and substantial endangerment to health to livelihood due to the nature of the discharge.

The 1970s saw other important environmental legislation: the 1974 Safe Drinking Water Act; amendments in 1975 to the Federal Insecticide, Fungicide and Rodenticide Act; the Toxic Substances Control Act of 1976; and the Resource Conservation and Recovery Act of 1976. Each of these environmental statutes had a broad environmental protection focus, however, certain provisions addressed specific, short-term hazardous materials safety concerns through subsequent regulation or through specific statutory provisions.

The 1974 Safe Drinking Water Act required EPA to develop and enforce maximum contaminant levels for contaminants in public water supplies, required states seeking to run their drinking water program to implement a program to provide drinking water under emergency conditions, and authorized EPA to take necessary action if there is a danger to public health. EPA encouraged the development of local drinking water contingency plans, although the Act did not require them. In 1986, amendments to the Act required state contingency plans for providing drinking water if ground water becomes contaminated.

The Toxic Substances Control Act of 1976 (TSCA) authorized EPA to regulate any manner or method of the commercial use of a chemical if it presents an unreasonable risk of injury to health or the environment.

The Resource Conservation and Recovery Act (RCRA) of 1976 authorized EPA to regulate hazardous waste generation, treatment, storage, disposal, and transport. Regulations promulgated under this Act included the development of RCRA facility contingency plans, physical integrity standards for waste treatment, storage, and disposal units, and a system for tracking and regulating the transportation of wastes, including such prevention elements as packaging, labelling, and a manifest system, in conjunction with DOT. A list of hazardous wastes as well as a criteria-based method for identifying hazardous wastes were also established as a result of this Act. In 1984, underground storage tanks were regulated under the authority of RCRA.

The 1976 Argo Merchant tanker oil spill off Nantucket Island, Massachusetts, resulted in a petition from the Commonwealth of Massachusetts for changes in the NCP. The Argo Merchant spill also gave scientists from the National Oceanic and Atmospheric Administration an opportunity to apply some of their scientific and technological research to a real situation. Another spill, resulting in 27 miles of shoreline damage to the Chesapeake Bay, brought additional attention to the accident problem. In response to these accidents, Congressional inquiries, and the language in the 1977 Clean Water Act Amendments, revisions were made to the National Contingency Plan, expanding the scope of the plan to include the economic zone defined in the 1976 Fishery Conservation and Management Act and applying the plan to potential as well as actual discharges.

Early in 1980, additional agencies were added to the National Response Team, including the Departments of Agriculture and Energy, although DOE predecessor agencies had been represented previously. The Federal Emergency Management Agency assumed the membership of the former Office of Emergency Planning. In addition, EPA and NOAA designated Scientific Support Coordinators to work with the on-scene coordinators during spill incidents.

Comprehensive Environmental Response, Compensation, and Liability Act

Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, in December of 1980. This legislation was developed after a number of hazardous waste sites received widespread public attention. Many of these sites were abandoned, a situation typified by Love Canal in New York. The Superfund legislation addressed an apparent gap in federal statutory authority. Before CERCLA, the federal government had a mandate to respond to spills of

oil and some hazardous substances to navigable waters, but response to spills or disposals that affected ground water, other surface water sources, the air, land, or soils were not clearly covered by federal law. CERCLA provided the federal government with the authority and resources to clean up hazardous substance releases, both for emergency and long-term response sites, that affect any environmental media. Over 700 hazardous substances may be addressed under CERCLA authority, based on lists of hazardous substances from other statutes including the FWPCA, the Clean Air Act, and RCRA. However, petroleum and natural gas were generally exempted from CERCLA's definition of hazardous substance.

Other important aspects of the legislation are the liability provisions which make responsible parties liable for the costs of clean-up, and the creation of the response trust fund which allowed EPA to conduct clean-ups. While CERCLA addresses emergency response, a majority of resources has been directed at non-emergency removals and remedial actions. Accident prevention, preparedness, and response have used only a small portion of CERCLA's resources.

The National Contingency Plan (NCP) has been revised to implement CERCLA requirements, and now includes coverage of spills to any environmental media of any of the designated hazardous substances. The revisions did not change the essential structure of the National Response System. Many changes to the NCP since the passage of CERCLA have involved the non-emergency aspects of CERCLA's removal program, rather than emergency response. In addition, increased emphasis is being focused on time-critical removals, (i.e., actions with less than six months of planning time before the removal is initiated), non-time critical removals (actions where there is more than six months planning time available before an action needs to be initiated), as well as remedial programs. Thus today, removal actions are becoming a major part of the Superfund effort. EPA responds to land and inland waterway (inland zone) emergencies; Coast Guard has jurisdiction over those that happen in coastal areas and at sea (coastal zone). Because of its major responsibilities for non-emergency clean-ups, EPA's organizational response structure differs from the Coast Guard's structure. EPA's On-Scene Coordinators generally handle removals, including emergencies, and Remedial Project Managers (RPMs) handle long-term response actions. USCG has limited remedial responsibilities and is oriented toward emergency response to oil and chemical accidents, with some removal activities.

Emergency Planning and Community Right-to-Know Act of 1986

The significant environmental accidents of the mid- and late 1980s — Bhopal, India; Institute, West Virginia; Ashland, Pennsylvania; and the *Exxon Valdez* spill in Prince William Sound, Alaska — profoundly affected public attitudes toward hazardous materials and resulted in legislation that introduced new policy approaches to hazardous materials safety. The 1984 methyl isocyanate release from a Union Carbide plant in Bhopal, India, killed over 2,500 people. The devastation of this accident was broadcast around the world and its impact was immediate throughout the United States. By the end of 1985, over 23 states had enacted state right-to-know laws with community provisions for obtaining information and inventories on the location of hazardous materials in a state or locality; and 30 states had worker right-to-know legislation with provisions intended to provide workers with information on their exposure to hazards.

In 1985, just after the incident in Bhopal, India, there was a release of aldicarb oxime from a chemical plant in Institute, West Virginia. The release did not result in any deaths, however, over 100 people were treated for exposure to the chemical and, coming as it did in the U.S. after Bhopal, it placed the issue of hazardous materials squarely on the federal policy agenda. This led, in 1986, to Congress passing the Emergency Planning and Community Right-to-Know Act (EPCRA). Although included as Title III of the Superfund Amendments and Reauthorization Act (SARA), it was enacted as a separate statute from Superfund.

The passage of the Emergency Planning and Community Right-to-Know legislation was significant in hazardous materials safety policy for several reasons. First, it established public participation in and responsibility for hazardous materials emergency response planning. Citizens and public groups are required to be included on the local emergency planning committees (LEPCs). Second, EPCRA called for

coordination among local and state agencies in hazardous materials emergency planning and response. Prior to EPCRA, emergency response planning had usually been vested in specific, single local and state agencies, and coordination was not necessarily a feature in the planning process. Third, EPCRA gave individuals and communities the power and mechanisms of federal authority to obtain information about hazardous materials in their locality — the "right to know." EPA was assigned major federal responsibilities for program development, with state and local governments bearing primary responsibility for program implementation. While EPCRA does not apply to federal facilities, most federal agencies have implemented initiatives for voluntary compliance with this statute.

Although no federal resources were provided to the states to carry out the planning effort, the passage of EPCRA nevertheless placed greater emphasis on hazardous materials contingency planning than before. In the 1970s, some urban communities had begun to develop hazardous materials response units within their municipal fire departments, and increasingly those communities and states had begun to examine their hazardous materials safety responsibilities. In the early 1980s, state and local emergency managers included hazardous materials annexes for fixed facilities and transportation emergencies in their all-hazards plans required by FEMA. However, with the enactment of EPCRA and numerous state right-to-know laws resulting from Bhopal, communities were given the tools, particularly information on chemicals located in their communities, for more detailed contingency planning than they previously had.

Hazardous Materials Transportation Uniform Safety Act

In September, 1990, the Secretary of Transportation sent to the Speaker of the House of Representatives a proposed emergency preparedness bill. The bill was a cooperative effort of DOT, the Federal Emergency Management Agency, the Department of Labor/Occupational Safety and Health Administration, the Department of Energy, and the Environmental Protection Agency. Designed to coordinate the expertise and capability of each federal agency, the bill provided technical assistance to states, grants to fund state planning, training and exercises for response to hazardous emergencies, and evaluation of state emergency preparedness programs, all to be funded by the hazardous materials industry. The programs and grants were to be implemented in conjunction with State Emergency Response Commissions and Local Emergency Planning Committees established pursuant to section 301 of the Superfund Amendments and Reauthorization Act of 1986. These concepts were incorporated into the HMTUSA which authorized grants to states for planning ($5 million per year), grants to states and Indian tribes for training ($7.8 million per year), technical assistance by the federal agencies and a core curriculum. The core curriculum must include training and planning programs developed under other federal grant programs and enable public sector employees to comply with DOT, OSHA, EPA, and National Fire Protection Association standards. The grants are to be funded by hazardous materials shipper and carrier fees.

Oil Pollution Act of 1990

In 1988 and 1989, two more accidents focused more national attention on hazardous materials safety problems, specifically oil spills: the 1988 Ashland storage tank rupture in Pennsylvania in which over a million gallons of oil were accidentally released into the Monongahela River, and the 1989 *Exxon Valdez* grounding in which 10.8 million gallons of oil were discharged into Prince William Sound, Alaska, creating an oil slick that spread over 3,000 square miles and damaged over 350 miles of beaches in one of the most pristine natural areas of the country. As a result of investigations of these two accidents, Congressional inquiries, various studies, and other less dramatic spills, Congress enacted the Oil Pollution Act of 1990. This act amended the Federal Water Pollution Control Act by adding a number of measures designed to enhance prevention, expanding contingency planning requirements, enhancing response authorities, adding new planning and response structures at federal and local levels, and adding contingency planning requirements for vessels, and off-shore and certain on-shore facilities.

The primary features of the Oil Pollution Act that impact hazardous materials safety include provisions for: liability coverage; review of international cooperative response arrangements with Canada; licensure and registration procedures for merchant mariners; determination of the staffing standards for

foreign vessels; additional vessel and traffic safety standards; new contingency planning requirements; and a number of other provisions addressing specific problems resulting from the clean-up of the Exxon Valdez accident.

Clean Air Act Amendments of 1990

In 1990, Congress also amended the Clean Air Act to include sweeping new requirements for air pollution abatement, and added significant new, broader provisions for hazardous materials safety. Among its safety provisions was the requirement for EPA to promulgate a list of at least 100 chemicals, 16 of which were specified in the statute, based on specified criteria, which may result in significant harm to human health or the environment, and to prepare release prevention, detection, and response regulations. A separate section in the Clean Air Act Amendments also required OSHA to promulgate a similar rulemaking including a list of substances focusing on worker safety, with different requirements for the chemical list (e.g., OSHA's list had to include reactives).

The Clean Air Act Amendments also required the development of a Chemical Safety and Hazard Investigation Board with responsibilities for fixed-site events similar to those vested in the National Transportation Safety Board for transportation events. Another hazardous materials safety provision of the Act was language requiring this Review.

Figure 2-4 displays a chronology of environmental statutes, institutions, and events which trace the development of public policy for environmental safety measures.

FINDINGS

A number of findings regarding hazardous materials safety policy resulting from the passage and implementation of environmental laws can be made. These include:

- Early concern for hazardous materials spills was focused on oil, pollution to waterways, and solid waste.

- The American conservation movement of the 19th century led to the contemporary environmental movement. During the last two decades, general public environmental awareness, combined with public concern resulting from major accidents, contributed to the enactment of laws establishing current environmental policy, including hazardous materials safety policy.

- The National Contingency Plan, the primary federal plan for hazardous substances accidents and oil spills, established in the 1960s, remains the dominant planning mechanism for the overall federal emergency response system for hazardous materials safety. The National Response Team, established by the NCP in 1971, is the federal government's coordinating body for hazardous materials and oil accidents.

- Dramatic accidents involving hazardous materials have served as catalysts for significant new legislation and more extensive hazardous materials safety policy.

- Hazardous materials safety policies, related to accident prevention, preparedness and response, have typically been included in and derived from the statutory language of environmental legislation designed to address both short-term emergency and longer-term, non-emergency environmental problems.

- The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) expanded the government's emergency preparedness, response, and liability provisions, and provided funds for preparedness and response.

Figure 2-4: Environmental Safety — Chronology

YEAR	STATUTE	INSTITUTION	REGULATION/OTHER ACTION
1947	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) first enacted	USDA	
1948	Federal Water Pollution Control Act (FWPCA)		First broad federal legislation dealing with water pollution.
1962			Rachel Carson publishes Silent Spring.
1963	Clean Air Act (CAA)		Authorized funds for state air pollution programs.
1968			President initiates development of the National Contingency Plan (NCP). The initial NCP was drafted under DOI leadership.
1970	Water Quality Improvement Act		Added significant pollution related measures and required revisions to the NCP. Precursor for section 311 enacted.
1970		Council on Environmental Quality	NCP delegated to Council on Environmental Quality.
1970	Clean Air Act Amendments		
1970	National Environmental Policy Act (NEPA)	All federal agencies	Established federal responsibility for environmental protection within government programs.
1970	Reorganization Plan No. 3	Environmental Protection Agency formed (EPA)	
1970	Occupational Safety and Health Act (OSH Act)	Occupational Safety and Health Administration (OSHA) established	Established authority for worker protection, including protection from hazardous materials hazards.
1971	An Executive Order		Chair of NRT delegated to EPA.
1972	Federal Water Pollution Control Act Amendments	EPA/USCG	Amendments lay foundation for four principal regulatory programs addressing discharges in nation's surface waters. §311 pertains to spills, leaks, and other discharges from any system; §402 establishes a national water discharge permit system; §301, §304, and §307 establish general and industry-specific performance standards applying to discharges affecting industrial and municipal treatment works. §303 establishes requirements for state water quality standards and implementation plans.

YEAR	STATUTE	INSTITUTION	REGULATION/OTHER ACTION
1974	Safe Drinking Water Act (SDWA)	EPA	Required EPA to develop maximum contaminant levels for drinking water contaminants, and authorized EPA to take necessary action if there is danger to the public health.
1975	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Amendments	EPA	Required worker training, labeling, hazard information, emergency procedures, and a basic registration process.
1976	Toxic Substances Control Act (TSCA)	EPA	Authorized EPA to regulate "any manner or method" of the "commercial use" of a chemical if it presents unreasonable risk of injury to health or the environment; established system to identify chemicals new/proposed for commercial use.
1976	Resource Conservation and Recovery Act (RCRA)	EPA	Authorizes EPA to regulate hazardous waste generation, transport, treatment, storage, and disposal, and to enjoin solid waste emergencies.
1977/78	Amendments to FWPCA: Clean Water Act	EPA/USCG	Revised NCP; strengthened toxics control programs for surface waste discharges.
1977	Clean Air Act amendments	EPA	Required EPA to consider regulation of radionuclides. This led to radionuclides being listed as hazardous air pollutants, thereby making radionuclides hazardous substances regulated under CERCLA.
1980	Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	EPA/USCG/DOT	Gave EPA funding and broad authority to respond to emergencies involving uncontrolled releases or threats of releases to environment; also provided authority to compel responsible parties to clean up and authority to recover government costs spent on clean up. Established liability. Required adoption of listed chemicals by DOT.
1984	Hazardous and Solid Waste Amendments of 1984	EPA	Authorized EPA regulation of underground hazardous substance and petroleum storage tanks; amended other aspects of RCRA; and created leaking underground storage tank (LUST) trust fund.
1983		OSHA	OSHA promulgated hazard communication standard establishing system to inform workers of potential hazards through material safety data sheets 29 CFR 19190.1200
1986	Superfund Amendments and Reauthorization Act (SARA)	EPA	Amended CERCLA strengthening authority to conduct short term removal and long term remedial clean-up actions.
1986	SARA (126)	OSHA/EPA	OSHA and EPA required to promulgate HAZWOPER rule requiring hazardous waste plan and safety measures for workers at clean up sites or hazardous waste operations, and emergency responders. (Promulgated in 1989)

YEAR	STATUTE	INSTITUTION	REGULATION/OTHER ACTION
1986	Emergency Planning and Community Right-to-Know Act (EPCRA or SARA Title III)	EPA/states/ local	Established state/local contingency planning structure for hazmat; provided right-to-know authorities for communities to obtain information regarding hazards in their localities; established toxic release inventory.
1987	Water Quality Act	EPA	Required EPA to establish regulatory program for stormwater and sludge management; strengthened toxics control programs; created program to address diffuse sources of pollution.
1990	Clean Air Act Amendments	EPA/OSHA	Required EPA to develop prevention programs to minimize consequences of accidental release; established chemical safety board. Required OSHA to promulgate rule for process safety management to require hazards analysis and plan to protect worker (promulgated 2/92). Authorized Chemical Safety and Hazard Investigation Board.
		EPA	EPA to propose rule for risk management plans and publish EPA list of regulated substances. (1992)
1990	Hazardous Materials Transportation Uniform Safety Act	DOT/FEMA/EPA DOE/OSHA	Provided funding for first responder training and planning grants to states and local governments.
1990	Oil Pollution Act	USCG/EPA	Amends Clean Water Act, requires greater authority for planning and response; creates new planning structures; creates Oil Trust Fund among other provisions; requires facility contingency planning.

- Because hazardous materials safety measures have been included and derived from a host of environmental statutes, a patchwork system of laws, regulations, and organizational measures exists today.

- The Emergency Planning and Community Right-to-Know Act provides the public with information on hazards in their communities and creates state and local planning bodies with broad ranging participation from those with a stake in emergency response. Federal facilities are not required to comply with EPCRA although many have indicated their intent to voluntarily comply with this legislation.

RADIOLOGICAL MATERIALS SAFETY, NATURAL HAZARDS AND EMERGENCY MANAGEMENT

With the development of nuclear weapons in World War II, the United States found itself with more lethal hazardous materials than it had before. Following World War II, policies were developed to use these new, powerful materials as a peacetime energy source as well as for military protection. Two laws adopted in the post-war era, the Atomic Energy Act in 1946 and the Civil Defense Act in 1950, were to affect the course of hazardous materials safety policy development as well. The Atomic Energy Act established the Atomic Energy Commission (AEC) and the basis for the development of the commercial nuclear power industry. The first commercial reactor was licensed by the AEC in 1956. The Civil Defense Act established the basis for community planning and protection in the event of threats or attacks from U.S. enemies. While funding was authorized for civil defense purposes, planners also realized that other hazards could be

addressed as well. Thus, the Civil Defense Act created an emergency management infrastructure of personnel at the state and local levels.

When the EPA was established on Earth Day in 1970, it was assigned the responsibilities of the Federal Radiation Council (FRC). The FRC is chartered by the Atomic Energy Act to advise the President with respect to radiation matters, directly or indirectly affecting health, including guidance for all federal agencies in the formulation of radiation standards and in the establishment and execution of programs of cooperation with states.

In the early 1970s, organizational changes in state governments led the way for reorganization in emergency management at the federal level. Several states, led by Pennsylvania, began to merge their emergency management functions, including various disaster and flood programs, and civil defense into one organization. Governors of these states began to urge similar changes at the federal level. In 1977, President Carter requested a study for such a reorganization, and in 1979, the Federal Emergency Management Agency (FEMA) was established by Executive Order. [4]

Two events also occurred at or near the time of FEMA's formation that were to influence its policy and program initiatives. First, in 1978 as a result of the contamination and public fear caused by Love Canal, Disaster Relief Act authorities and funding were used by a FEMA predecessor to provide administrative emergency relief through temporary housing, although such housing was later replaced by permanent relocation. Second, the 1979 accident at Three Mile Island nuclear power plant became part of the impetus for establishing FEMA.

In the early 1970s, Congress also enacted statutes that formed the basis for federal government administration of important energy policy, including regulatory and organizational policies for radioactive materials. The Energy Reorganization Act of 1974 abolished the Atomic Energy Commission and distributed its developmental functions to the Energy Research and Development Agency (ERDA). The 1974 Act also placed the regulatory functions formerly held by the AEC with the newly created Nuclear Regulatory Commission. This 1974 legislation signalled a major change in policy toward nuclear energy and safety because it separated commercial nuclear power licensing and safety from energy-related research and development activities. In 1977, ERDA was abolished and replaced by the Department of Energy (DOE).

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[4] Executive Order 12148

A number of offices and administrations were consolidated to form FEMA, including:

- The Defense Civil Preparedness Agency (DoD). This agency administered the national civil defense program which provided guidance and funds to local governments for attack preparedness and, as a secondary mission, natural disaster preparedness.
- The Federal Disaster Assistance Administration (HUD). This branch coordinated and funded federal natural disaster relief activities.
- The Federal Preparedness Agency (GSA). This agency coordinated civil planning for national emergencies.
- The Federal Insurance Administration (HUD). This agency managed flood insurance and flood hazard mitigation programs.
- The United States Fire Administration (DOC). This agency assisted state and local governments in planning for, mitigating, preventing, and responding to fire incidents.

In addition to major operating components, other ancillary functions such as the severe weather emergency program from the National Weather Service (DOC), the Earthquake Hazard Reduction Program (Office of Science and Technology Executive Office of the President (OST-EOP)), the Dam Safety Coordination Program (OST-EOP), and the Federal Emergency Broadcast System (OST-EOP) were also consolidated into the new agency.

The 1979 accident at the Three Mile Island nuclear power plant galvanized public attention on safety issues related to radioactive materials. As a result of this accident, President Carter established the Kemeny Commission to conduct a comprehensive study and investigation of the Three Mile Island accident. The Kemeny Commission found that planning by the utility, the State of Pennsylvania, the involved counties, and the federal government was inadequate to cope with this accident and made recommendations for improving the planning and response capabilities of utilities and federal, state, and local governments for commercial nuclear power plant emergencies. One of its recommendations was that FEMA should be given the federal lead role for improving off-site radiological emergency planning and response. Given FEMA's role for coordinating emergency preparedness activities under Executive Order 12148, and the Commission's recommendation, the lead role for off-site radiological emergency preparedness activities was assumed by FEMA through a Presidential Directive on December 7, 1979. As a result, FEMA established its Radiological Emergency Preparedness (REP) Program.

Public Law 96-295, 1980 NRC Appropriations Authorization, established a new legal basis for the licensing of commercial nuclear power plants to ensure a certain degree of emergency planning and preparedness. Adequate emergency planning and preparedness for off-site locations was made a condition of licensure. Adequacy of off-site preparedness was determined using the criterion of "reasonable assurance." The NRC was required to consult with FEMA in making licensing determinations. The President was also directed to prepare and publish a plan which would provide for an expeditious, efficient, and coordinated federal response to an accident at a commercial nuclear power plant. Subsequent NRC Appropriations Authorizations in 1983 and 1984 echoed some of these same themes.

The Federal Radiological Emergency Response Plan (FRERP) administered by FEMA with the coordinating body comprised of 17 federal agencies became the operative plan for responses to significant radiological events by the federal government. In addition, regulations for contingency planning by communities located near commercial nuclear power plants were implemented by FEMA in coordination with the Nuclear Regulatory Commission.

More recent public concerns and government policy developments regarding radioactive materials have focused on preparations for transportation and disposal of high level radioactive wastes from commercial nuclear power plants. DOT transport regulations and the 1982 Nuclear Waste Policy Act are two arenas in which policies for these materials have been developed. If transport accidents occur involving such materials, research and testing indicate a low probability of radiological consequences because of the design and performance of transport casks. However, adverse public perception and fear regarding these materials remains extremely high.

In the early 1980s, FEMA created its Comprehensive Cooperative Agreements (CCA) program consolidating its many financial and technical assistance programs into a single mechanism which supported state and local governments' emergency management infrastructure through annual allocations of over $100 million.

On April 26, 1986, the worst civil radiological accident ever occurred when unauthorized testing on reactor number four at the Soviet Union's Chernobyl nuclear power station caused it to explode and burn, emitting large quantities of radioactive material. In the days following the accident, the Soviets released sparse data on the severity of the accident and almost no data on the extent of radioactive fallout in Europe and the rest of the world. The White House designated EPA as the leader in coordinating the U.S. response to this global emergency. EPA began monitoring and assessing radioactivity in the United States, based in part on daily samples from its Environmental Radiation Ambient Monitoring System. The system first detected radiation from the accident at ground level on the West Coast one week after the accident. The radioactivity concentrations were well below levels requiring protective actions. In addition, EPA dispatched response personnel to Europe to monitor and assess levels of radioactivity in U.S. embassies. Proposed revisions to the FRERP incorporate this experience by designating EPA as the lead federal agency for accidents involving unlicensed sources.

Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988

Another major addition to the emergency management of natural disasters occurred with the enactment of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, administered by FEMA. The predecessor to this Act, the Disaster Relief Act of 1974, established government relief through emergency funding for communities devastated by natural disasters. A subsequent 1984 amendment expanded disaster relief to cover damage from catastrophic earthquakes. The 1988 amendments expanded the focus to include all major or catastrophic disasters, regardless of cause. From the authority of this Act, FEMA established a program and plan for disaster preparedness that utilized the services of all appropriate agencies to respond to disasters of such severity and magnitude to warrant federal financial assistance. On the basis of this Act, FEMA modified the Federal Response Plan (FRP) which involves participation and coordination among 27 federal agencies who may be called upon to provide assistance in a major disaster. The Federal Response Plan was originally drafted as the response mechanism for earthquakes and other natural catastrophes. Response to disasters involving hazardous materials and radioactive materials may be activated under the Federal Response Plan umbrella, but the FRP does not supersede the National Contingency Plan or the FRERP.

Figure 2-5
Radiological Safety and Emergency Management — A Selected Chronology

YEAR	STATUTE	INSTITUTION	REGULATION/OTHER ACTION
1946	Atomic Energy Act	Atomic Energy Commission (AEC) established	Allowed for investigation of peacetime development and use of nuclear energy; prohibited private ownership of nuclear materials.
1950	Civil Defense Act	DOD established	
1954	Atomic Energy Act Amendments		Opened nuclear power industry to private enterprise; regulated emerging industry; adopted necessary safety rule.
1956		AEC	Issued first contract for commercial reactor.
1957	Price Anderson Act		To assure adequate public cooperation in the event of a nuclear accident; to set limit on liability of private industry; established $560 million trust fund.
1963		AEC	First commercial processing plant
1970	President's Reorganization Plan #3	EPA	EPA established. EPA assumed Federal Radiation Council responsibilities.
1974	Disaster Relief Act		Established government relief funds for communities devastated by natural disasters.
1974	Energy Reorganization Act	Energy Research & Development Agency (ERDA) & Nuclear Regulatory Commission (NRC) established	AEC was abolished, and its functions reorganized.
1977	Department of Energy Organization Act	Department of Energy established	Responsible for nuclear weapons research and development; weapons complex environmental restoration; and national energy policy.

YEAR	STATUTE	INSTITUTION	REGULATION/OTHER ACTION
1977	Earthquake Hazards Reduction Act, as amended		
1979	Executive Order 12148	Federal Emergency Management Agency (FEMA) established	
1980	NRC Appropriation legislation	NRC/FEMA	Spurred development of FRERP
1982	Nuclear Waste Policy Act	DOE	Established policy for determination of nuclear waste burial sites and implementation program.
1985		FEMA	FRERP first published.
1988	Robert T. Stafford Disaster Relief and Emergency Assistance Act	FEMA	Used as the basis for the development of the Federal Response Plan (FRP)
1992			All 28 agencies agree to major components of the FRP. ESF#10 is the hazardous materials component. ESF#13 is now under consideration to provide the FRP/FRERP linkage for radiological emergencies.

CONCLUSIONS

Federal involvement in hazardous materials safety has evolved over this century, so that today it encompasses laws, regulations, and programs designed to provide: transportation safety, worker safety, public and environmental safety, protection from radioactive materials, and emergency management support. History indicates that the laws were crafted to address hazardous materials safety problems through the specific missions of different government agencies. Prevention, preparedness, and response measures for hazardous materials safety have not been addressed systematically in the development of policy either by Congress or by the Executive Branch.

The unprecedented number of laws with hazardous materials safety provisions enacted during the last two decades have created a maze of regulations and programs. For better or worse, some of these laws have been enacted directly as a result of serious accidents involving extreme loss of life such as Bhopal, or damage to the environment as in Exxon Valdez. Typically these accidents served as catalysts, giving lawmakers the opportunity to enact measures that had been studied and debated for some time, in addition to developing measures in direct response to the given accident.

In reviewing the hazardous materials safety history, the complexity of the system begins to emerge. As will be shown, the large numbers of laws, particularly for environmental matters, suggest the need for a systems approach, consolidating and rationalizing the disparate measures in such a way that both the regulators and the regulated can understand the system, and government can become more efficient in its implementation of safety measures.

A number of concepts and issues, and a number of differing regulatory approaches to providing safety have been adopted. The following chapters explore specific benefits and issues inherent in the federal government's existing approach.

CHAPTER 3. THE STATUTORY, REGULATORY, & ORGANIZATIONAL FRAMEWORK FOR THE HAZARDOUS MATERIALS SAFETY SYSTEM

INTRODUCTION

This chapter gives a broad overview of the legal and regulatory framework for federal hazardous materials accident prevention, preparedness, and response, and examines the role of the federal government in hazardous materials safety, as reflected by the authorities and programs of its implementing Agencies and Departments.

The similarities and differences in the various approaches taken by federal regulatory agencies charged with safety responsibilities are explored, and the safety provisions in the laws, regulations, and Executive Orders that comprise the existing statutory and regulatory framework are identified. The institutional structure currently in place to create and administer the laws and programs is also described.

Within the legal framework, clear dividing lines or definitions for determining whether a provision falls into the category of prevention, preparedness, or response do not exist. Distinctions, particularly in the environmental statutes, are also difficult to make between what constitutes a general environmental protection program and what is specifically accident prevention. For example, standards relating to container structural integrity under hazardous waste regulations prevent both catastrophic structural failure as well as ordinary leaks. Therefore, the descriptions of legal and regulatory provisions included in this and other chapters, particularly those contained in environmental statutes, are based on the collective experience and judgement of those responsible for implementing the laws and administering the accidental release safety programs and are not necessarily exhaustive of all authorities pertaining to emergencies. The Review is inclusive in approach, (i.e., many of the laws and regulations were broadly interpreted as to their effect on safety).

THE FEDERAL ROLE

The federal role in hazardous materials safety evolved over the past century, so that today it is a complex system of accident prevention, preparedness, and response laws, regulations, and programs. In general, the primary functions of the federal government for hazardous materials safety are as follows.

The primary Federal role in prevention is to:

- Establish and enforce regulations which prevent accidents and incidents involving hazardous materials in any of the transportation modes (i.e., air, water, truck, and rail) consistent with international standards whenever practical;

- Establish and enforce standards to prevent workplace accidents involving hazardous materials; and,

- Establish and enforce regulations to prevent hazardous materials accidents which result in near and long-term environmental degradation and adversely impact health.

Ancillary functions pertinent to regulatory development are the education and training programs necessary to implement new regulations developed in any of the above mentioned areas.

The primary federal role in preparedness is to:

- Provide the mechanisms, information, and to a limited extent, funds, to enable planning bodies of state and local governments and Indian tribes to adequately plan for any contingency that might result in an accident involving hazardous materials;

- Ensure that technical training is provided for first response;
- Establish and enforce training standards for site safety and clean-up;
- Develop contingency plans at the regional and national levels for responding to those emergencies exceeding the capabilities of local and state governments;
- Develop contingency plans specifically directed at navigable waterways, which are, in many cases, not within the jurisdiction of state and local governments; and,
- Coordinate contingency planning with state and local governments to ensure effective response.

The primary federal role in emergency response is to:

- Provide additional resources and capabilities when an accident involving hazardous materials exceeds the capabilities of local and state governments to respond or mitigate the accident consequences (response to accidents occurring on navigable waters is primarily a federal responsibility);
- Provide financial liability provisions that require responsible parties to clean up or pay for clean-up of accidents;
- Provide technical expertise and resources to clean up accidents when responsible parties cannot be located or are unwilling or unable to conduct appropriate clean-up actions, or when local and state governments are unable to complete clean-up;
- Monitor responsible party clean-up to ensure that it is protective of public health and the environment;
- Provide resources and training, to the extent possible, for first responder training for government personnel;
- Establish regulations for accident/release notification;
- Investigate, collect and analyze information on those accidents resulting in casualties and severe consequences; and,
- Assure appropriate protection of workers engaged in response and clean-up.

By far, the majority of accidents are handled by the facilities themselves and local government agencies —fire and police. Therefore, with the exception of response to accidents occurring in navigable waterways, the thrust of the federal responsibility is to support local efforts, and to respond in those rare instances where the accident exceeds local and state capabilities.

THE STATUTORY & REGULATORY FRAMEWORK

Numerous laws contain sections that guide or impact accident prevention, preparedness, and response for hazardous materials. Figure 3-1 identifies those laws by general subject area, i.e., environmental, transportation, worker protection, radioactive materials, and emergency management areas.

Different aspects of hazardous materials safety are addressed by the various hazardous materials statutes. Some laws, such as HMTA, are comprehensive in scope within a general subject area, and are designed for transportation safety. Others, such as RCRA, are primarily directed at developing a system for addressing a source of environmental degradation, although they contain provisions that address specific

Figure 3-1: Relevant Statutes

Environmental

- Comprehensive Environmental Response Compensation and Liability Act (CERCLA)
- Clean Water Act/Federal Water Pollution Control Act (CWA/FWPCA)
- Clean Air Act (CAA)
- Clean Air Act Amendments (CAAA)
- Emergency Planning and Community Right-to-Know Act (EPCRA)
- Oil Pollution Act (OPA)
- Resource Conservation and Recovery Act (RCRA)
- Toxic Substance Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- Safe Drinking Water Act (SDWA)
- Underground Storage Tanks (Subtitle I of RCRA) (UST)
- Pollution Prevention Act (PPA)

Transport

- Hazardous Material Transportation Act (HMTA)
- Hazardous Material Transport and Uniform Safety Act (HMTUSA)
- Comprehensive Environmental Response Compensation and Liability Act (CERCLA)
- Resource Conservation and Recovery Act (RCRA)
- Oil Pollution Act (OPA)
- Ports and Harbors Safety Act (PTSA)
- Natural Gas Pipeline Safety Act of 1968 (NGPSA)
- Hazardous Liquid Pipeline Safety Act of 1979 (HLPSA)
- Tanker Safety Act
- Federal Water Pollution Control Act

Worker Protection

- Occupational Safety and Health Act (OSHA)
- Clean Air Act Amendments (CAAA section 304)
- Superfund Amendments and Reauthorization Act (SARA section 126)

Radiological

- Atomic Energy Act (AEA)
- Price Anderson Act
- Nuclear Waste Policy Act (NWPA)
- Comprehensive Environmental Response Compensation and Liability Act (CERCLA)
- Defense Nuclear Facilities Safety Board (DNFSB)
- Nuclear Regulatory Commission Appropriations Act of 1980

Emergency Management

- Civil Defense Act
- Stafford Act
- Emergency Planning and Community Right-to-Know Act (EPCRA section 305(a))
- Firefighters Safety Study Act
- Defense Authorization Act —Chemical Stockpile Emergency Preparedness Program (CSEPP)
- Earthquake Hazards Reduction Act

safety related matters. The regulations promulgated under all of the statutes also create a significant body of law for addressing safety. Appendix 3-A generally describes the regulatory framework pertinent to accident prevention, preparedness, and response for each of the relevant agencies.

In reviewing the statutes and regulations, different types of release prevention, mitigation, and response provisions were identified in the laws. The types of provisions include:

- Hazardous material safety-related definitions and exemptions;

- Hazard classification systems including: list-based, criteria-based, or lists with criteria systems;

- Technical and administrative requirements, including: technology, performance and design standards; hazard evaluation guidelines; manufacturing and equipment standards; disposal standards; certification, registration, and permitting standards; human factors and operating standards; training standards for prevention;

- Information collection and dissemination, including: reporting for prevention; reporting for planning; accident notification and follow-up; and accident investigation; research; right-to-know; and other chemical information;

- Planning and response measures, including: contingency planning; training programs and drills; response authority; and clean-up authority;

- Financial assurance, including: governmental trust funds, cost recovery and insurance or financial responsibility;

- Funding, including: fees or taxes; grants for training, planning, or response; matching funds for state/local implementation; and fee systems;

- State and local delegation or implementation;

- Enforcement and penalty authority (liability); compliance and inspection (both federal and state); and citizen suits;

- Treatment of federal facilities;

- Relationship to international standards or policies; and,

- Coordination with other agencies or departments.

While similarities exist in the areas addressed by different statutes and implementing agencies, the requirements and definitions established by those regulations differ widely, thus causing, in some instances, duplication, overlaps, and confusion.

EXECUTIVE INTERAGENCY COORDINATION AND LEGISLATIVE COMMITTEE COORDINATION IN THE DEVELOPMENT OF HAZARDOUS MATERIALS SAFETY POLICIES

Like many contemporary, technologically driven issues, hazardous materials safety is complex and multifaceted. The regulatory maze that now exists for addressing safety requires constant, labor-intensive efforts at coordination, which in many cases is made more difficult by the mission, history, and turf protection inherently part of the federal agencies and the bureaucratic system. Some statutes require coordination among federal agencies in the development of a particular provision. Agencies and Departments have also entered into Memoranda of Understanding on a host of necessary safety subjects. Most environmental statutes are implemented by EPA; although some laws, such as SARA, RCRA, OPA and CAAA, also contain provisions developed or implemented by DOT, DOT/USCG, FEMA, and OSHA, as well as other federal agencies.

Typically, coordination for contingency planning is undertaken by planning bodies, such as the National Response Team, with multiple agency representation. However, coordination in the development of prevention regulations or programs, if undertaken, is usually conducted by the specific parties with regulatory or programmatic authority responsible for developing a given provision. A forum, other than OMB, for

coordinating information related to prevention programs has not existed. Because prevention and regulatory actions may affect multiple federal agencies, the recent National Response Team Task Force Report on Hazards Controlled by the Federal Government recommended that an NRT Prevention Committee be established to serve as a forum for early discussion of interagency regulatory matters.

The vast number of laws and regulations enacted with provisions to prevent, prepare for, or respond to accidents have been generated by a number of different committees of the U.S. Congress and the resulting host of different federal departments and agencies. Research was not undertaken to specifically identify the multiple committee jurisdictions covering this subject. However, the multiple laws enacted independently of one another, and the regulatory structure developed by the multiple federal agencies, show the difficulties of regulating technical issues in a political environment. The number of congressional committees and subcommittees with various jurisdictional responsibilities impacting hazardous materials safety contributes to the fragmentation within the statutory and regulatory framework. Neither the legislative nor the executive branch has effectively developed a comprehensive policy regarding hazardous materials safety.

CURRENT ORGANIZATIONAL STRUCTURE FOR HAZARDOUS MATERIALS SAFETY

The current organizational structure and mechanisms created to administer hazardous materials safety policies reflect the scope and evolution of statutory developments for safety. Numerous offices within multiple agencies and departments are responsible for accident prevention, preparedness, and response regulations and programs. As previously stated, the lines between accident prevention and preparedness, or preparedness and response, are often not clear. The National Response System, as defined in the National Contingency Plan and authorized by statute, delineates the specific roles of the 15 Federal agencies with responsibility for some aspect of emergency response to hazardous materials accidents.

Primary responsibility for the development and implementation of accident prevention measures at the federal level is within DOT, including the U.S. Coast Guard; OSHA within the Department of Labor; and EPA. The NRC also maintains regulatory responsibilities for source, by-product, and special nuclear materials. Some of the statutes and regulations administered by NRC, in conjunction with FEMA, particularly in the areas of planning and response to significant radioactive materials emergencies, are discussed in this review. Other laws and regulations pertinent to the safety of commercial nuclear power plants were not considered within the scope of this analysis. Food and Drug Administration authorities for consumer-related hazardous materials safety were not considered within the scope of this review.

Primary responsibility for development and implementation of hazardous materials contingency planning and emergency response within the Federal government is with:

- The US Coast Guard and EPA for contingency planning and response to oil and hazardous substances accidents, under the National Contingency Plan; and,

- The NRC, FEMA, DOD, DOE, and EPA for planning and response to accidents involving significant amounts of radioactive materials, under the Federal Radiological Emergency Response Plan (FRERP).

FEMA, under Executive Order 12148, is responsible for establishing policies and coordinating emergency planning, response and assistance functions of the federal government for all types of catastrophic natural, technological or national security threats and emergencies, including hazardous materials. The Federal Response Plan (FRP) is an umbrella plan for such catastrophes, although it does not supersede the authorities of the other plans.

Accident investigations are conducted by the US Coast Guard, EPA, OSHA, DOT, the National Transportation Safety Board (NTSB), and the Chemical Hazard and Safety Investigation Board, when established, for investigations of oil and hazardous materials accidents; and NRC, DOD, DOE, EPA, DOT, and NTSB for investigation of accidents involving radioactive materials.

Training programs for first responders as well as advanced response training are offered by multiple agencies. However, primary first responder training authorized by the Hazardous Materials Transportation Uniform Safety Act, is being administered by DOT with assistance of other federal agencies. FEMA offers extensive hazardous materials response training at the National Fire Academy, and EPA offers first responder and advanced training through its Environmental Response Team and regional programs. OSHA (and EPA, for public employees in some states) by regulation requires extensive training for persons who respond to and clean up emergency sites.

Chapters 5 and 6 discuss the framework for contingency planning and response in detail.

In addition to the agencies and departments with primary responsibility for prevention, preparedness, and response, a host of other agencies also have support responsibilities for hazardous materials safety. These responsibilities are discussed in sections on Federal Facility Programs and Activities and on Non-Regulatory Agency Support.

DOT/Research and Special Programs Administration (RSPA)

The administering body for hazardous materials safety within DOT is the Research and Special Programs Administration. The Hazardous Materials Transportation Act (HMTA) of 1975 gave DOT umbrella authority for developing hazardous materials transportation safety policy. It enabled the Office of Hazardous Materials Safety to develop policies pertinent to all modes of transportation. HMTA authorized the Secretary to issue regulations for the safe transportation in commerce of hazardous materials. The Hazardous Materials Transportation Uniform Safety Act (HMTUSA) of 1990 expanded DOT's hazardous materials safety responsibilities and clarified certain provisions contained in the original HMTA.

RSPA Prevention and Regulatory Programs. RSPA's Office of Hazardous Materials Safety has primary responsibility for regulating the transport of hazardous materials across all modes except pipelines. Because of the multiple points of exposure during transportation and the potential for exposure to hazardous material handlers and first responders, the primary goal of these regulations is to prevent accidents from occurring. A secondary goal is to ensure that response personnel can easily identify the materials, so that the appropriate actions and precautions can be taken if an accident does occur. The regulations address: criteria for classifying risks of materials being transported; identification through proper labelling and manifesting of what is being transported; containerization and packaging for transport; handling of hazardous materials in loading and unloading; and procedures for accident notification and follow-up reports.

Federal hazardous materials regulations (except for penalties and specific relief provisions) apply to all agencies of the Federal government with the exception of the U.S. Postal Service. They also apply to all contractors used by Federal government agencies.

RSPA's Office of Pipeline Safety oversees the safe transportation of natural gas to 55 million residential and commercial customers, and the environmentally sound transportation of 25 percent of the nation's intercity freight, more than 605 billion ton miles of petroleum and other hazardous materials by pipeline. This office has jurisdiction over more than 2,000 gas pipeline operators and 155,000 miles of pipeline that transport hazardous liquids, and is authorized under the Natural Gas Pipeline Safety Act of 1968 and the Hazardous Liquid Pipeline Safety Act of 1979 (HLPSA). Following enactment of the Oil Pollution Act of 1990, the Department delegated responsibility for spill prevention and containment of oil and hazardous substances from pipelines to RSPA. These responsibilities, defined under the Federal Water Pollution Control Act, further expand the role of RSPA in environmental protection, and cover categories of pipelines currently excepted by the HLPSA or regulations adopted thereunder. Pipeline safety regulations cover criteria for pipe design, joining of materials, construction, customer meters, service regulators and service lines, corrosion control, testing, upgrading, operations, and maintenance. Enforcement of the regulations is shared by 244 State and 24 Federal inspectors.

RSPA Enforcement. RSPA has the primary federal responsibility for enforcing hazardous materials regulations for transportation. RSPA's enforcement process includes random inspections of packaging

manufacturers, shipper and carrier facilities, and investigations of accidents and incident involving hazardous materials. In addition to RSPA's enforcement program, the DOT modal administrations (Federal Highway Administration, Federal Aviation Administration, Federal Railway Administration, and U.S. Coast Guard) and the states also enforce the hazardous materials regulations.

RSPA Training. More recent initiatives, developed in response to HMTUSA, are focusing on providing grants for emergency preparedness planning to states and grants for emergency response training to states and Native American tribes. The Office of Hazardous Materials Safety is administering a planning and training grant program assisted by other federal agencies, including FEMA, EPA, DOE, OSHA, NIEHS and the Bureau of Indian Affairs. DOT also offers training through the Transportation Safety Institute and prepares and distributes training modules and other materials. In addition, the Federal Highway Administration provides funds for training to states.

DOT/U.S. Coast Guard

USCG Regulatory Programs. The Coast Guard maintains regulatory authority for bulk carriers by water transport. Because authority for transportation by navigable waters has historically been a federal responsibility, the Coast Guard exercises a unique and broad authority over the shipping industry. In general, its application of an "umbrella" regulatory structure controls vessel design, operations, pollution prevention, personnel qualification, and a number of other categories. Domestic and foreign vessels operating on the navigable waters of the United States are required to have proper licensing and documentation in order to operate, and in the case of commercial vessels, to take part in their trade. The Coast Guard is responsible for issuing these certificates and endorsing certificates issued by international organizations.

Among the provisions administered by the Coast Guard are regulations concerning:

- The boundaries for Coast Guard jurisdiction;
- Specific requirements for obtaining waivers to inspection laws and regulations;
- The transportation of hazardous materials in vessels, including the carriage of explosives, and port and waterway safety;
- The prevention of pollution from ships and the enforcement of waste reception facility requirements;
- The prevention of oil discharges into the navigable waters of the U.S.;
- The protection and security of vessels, harbors and waterfront facilities;
- Dry bulk waterfront facilities; and
- The oversight of and prevention of unlawful dumping or transportation of materials for dumping into the ocean (the EPA exercises most of the regulatory authority over this activity).

The Ports and Waterways Safety Act of 1972 provides for the establishment, operation, and maintenance of vessel traffic services, the control of vessel movement, among other matters, and the establishment of vessel operating requirements. The act allows for field level controls that, if not appropriately applied, would result in an unacceptable hazard to the environment or property. Orders regarding these matters can be issued only by the Captain on the Port or the cognizant District Commander.

The Federal Water Pollution Control Act (FWPCA), as amended, delegates to the Coast Guard the enforcement authority and responsibility in cases where oil and hazardous substances are discharged in harmful quantities. The Coast Guard is also tasked with enforcement of the Act to Prevent Pollution From Ships, which is the implementation of the international MARPOL protocol. The Coast Guard also conducts surveillance of ocean dumping as mandated in the Marine Protection, Research, and Sanctuaries Act of 1972.

USCG Enforcement. Inspection, compliance, and enforcement are cornerstones to the Coast Guard's prevention programs. The Officer in Charge of Marine Inspections exercises considerable power in his/her port and is responsible for:

- Inspection of vessels and facilities to determine compliance with applicable laws, rules and regulations related to construction, equipment, manning, and operation;
- Shipyard inspections;
- Factory inspections of materials and equipment;
- Licensing, certification, shipment and discharge of seamen;
- Investigation of marine casualties and accidents;
- Pollution prevention;
- Investigations of violations of the law;
- Negligence, misconduct, unskillfulness, incompetence of persons holding licenses, certificates or documents issued by the Coast Guard;
- Initiations of actions seeking suspension or revocation of licenses; and
- Presentation at hearings held by Administrative Law Judges concerning these cases.

New vessels, foreign vessels, waterfront transfer and storage facilities, tankers, and a variety of other vessels are all required to be inspected by the Coast Guard. Certificates of inspection are issued and grant specific rights to each ship. Each class of vessel has unique inspection regulations based on the type of vessel it is and the specific cargo that it carries.

If any equipment is found not to be in compliance with applicable regulations, a form is issued to the master, owner, or operator which details the problems and mandates the specific circumstances that the cited deficiencies must be corrected. Any vessel may be inspected/reinspected. Certificates of inspection may be revoked if the vessel is found not to comply with the terms of the vessel's certificate of inspection. A vessel or facility may be exempted from complying with any specific regulation by the Commandant.

Investigations are conducted after a marine casualty to determine cause and to determine appropriate proceedings to be taken against those responsible. Investigating officers have the power to administer oaths, subpoena witnesses, etc. At the conclusion of an investigation, recommendations are forwarded to Coast Guard Headquarters program managers for review and further action as appropriate. In investigations where criminal liability is alleged, the case is referred to the U.S. Attorney General for prosecution.

Administrative punishments are intended to be remedial, not penal, with the goal of maintaining competence and safety in the field. Initial recommendations to revoke licenses are set forth by the investigating officer. Investigations are initiated if it appears that the holder of the license was negligent in some manner. An investigating officer can accept voluntary surrender of a license. Upon completion of a case investigation, the case is forwarded to an Administrative Law Judge, who holds hearings and adjudicates the cases.

Prior to the Federal Water Pollution Control Act of 1972, the Coast Guard did not have the kind of authority it needed to enforce against discharges. The Ports and Tanker Safety Act of 1978 expanded many equipment and operating requirements for vessels, with emphasis on tank vessels to coincide with many international initiatives, such as agreements reached by the International Maritime Organization.

Coast Guard Organization. The Coast Guard maintains 47 Captain of the Port operations. The functions performed by the Coast Guard at each of these locations include: port security, port safety, facility

inspections, personnel/merchant mariners documentation, vessel inspections and accident response and investigation.

Like other transportation modes, the Coast Guard's program is predicated upon prevention. However, unlike other transportation authorities, because of the history, mission, and unique resources of the Coast Guard, it maintains and is responsible for a total safety system including accident prevention, preparedness, and response.

Other Modal Administrations

Federal Aviation Administration (FAA). The FAA regulates air commerce, controls the use of airspace, and operates air navigation facilities and a common system of air traffic control and navigation for both civil and military air craft. The Administrator issues and enforces rules, regulations, and minimum standards relating to the manufacture, operation, and maintenance of aircraft, as well as the rating and certification of airmen and the certification of airports. The agency performs flight inspection of air navigation facilities in the U.S. and as required, abroad. It also enforces regulations under the Hazardous Materials Transportation Act applicable to shipments by air and investigate accidents involving air carrier.

Federal Highway Administration (FHWA). The FHWA seeks to coordinate highways with other modes of transportation to achieve the most effective balance of transportation systems and facilities. Under the authority of the motor carrier safety provisions, the agency exercises Federal regulatory jurisdiction over the safety performance of all commercial motor carriers engaged in interstate or foreign commerce. The FHWA has jurisdiction over the safe movement on U.S. highways of dangerous cargoes such as hazardous wastes, explosives, flammables, and other volatile materials, and deals with more than 185,000 carriers and approximately 25,000 shippers of hazardous materials.

The FHWA conducts safety reviews at carriers' facilities to determine their safety performance; all carriers must comply with Federal safety regulations specifying safe operating practices. Compliance reviews are conducted to follow up on problem areas identified during safety reviews. These reviews may lead to prosecution or other sanctions against violators of the Federal motor carrier safety regulations or the hazardous materials transportation regulations.

The FHWA works with states and local government enforcement officers to enforce regulations affecting interstate transportation. It provides grants to assist the states and local governments in enforcing those regulations and encourages states to adopt regulations compatible with federal standards.

Federal Railroad Administration (FRA). The FRA promulgates and enforces rail safety regulations, administers railroad financial assistance programs, conducts research and development in support of improved railroad safety and national rail transportation policy, provides for the rehabilitation of Northeast Corridor rail passenger service, and consolidates government support of rail transportation activities. The FRA administers and enforces regulations resulting from the Railroad Safety Act and transportation of explosives and other hazardous materials under the Hazardous Materials Transportation Act, and the reporting and investigation of railroad accidents.

National Transportation Safety Board (NTSB)

The National Transportation Safety Board is an independent agency that originated within the U.S. Department of Transportation (DOT). Congress passed an Act in 1975, giving the Board increased authority in accident investigation and severing its ties with DOT. The Board's mission is to determine the "probable cause" of transportation accidents and to formulate safety recommendations to improve transportation safety.

DOL/Occupational Safety and Health Administration (OSHA)

Authority for worker protection and hazardous materials prevention programs is housed in the Occupational Safety and Health Administration (OSHA), established within the Department of Labor in

1970. The Occupational Safety and Health Act (OSH Act) gives OSHA authority to promulgate its hazardous materials regulations. In addition, SARA and the 1990 Clean Air Act Amendments included OSHA requirements. OSHA's regulatory system is one which has developed requirements that apply to safety of all industries. OSHA promulgates regulations, inspects workplaces, enforces regulations, conducts workplace safety and health training, disseminates information, collects data, and investigates workplace accidents.

OSHA Regulatory Programs. The specific OSHA hazardous materials program includes standards for: the handling and storage of liquids that are flammable and combustible and of certain chemicals that are reactive and unstable; the design, installation, and use of storage tanks; fire protection within a facility; firefighting operations, including training and equipment; emergency preparedness and evacuation plans; permissible exposure limits for more than 600 air contaminants; employee access to medical records of their workplace exposures to toxic substances or harmful physical agents; medical services and first aid; protection of workers engaged in hazardous waste operations; respiratory protection; use of personal protective equipment; communication of information about hazardous chemicals, including the important requirement that employers train workers in the precautions needed to minimize the risk of potentially dangerous exposures; and, the control of hazardous energy sources, also known as lockout/tagout. OSHA recently issued its chemical process safety standard requiring employers to conduct hazard assessments of chemicals and chemical processes and to develop programs to manage these risks including the training of workers. For hazards not addressed by a particular standard, OSHA enforces the "General Duty Clause" of the OSH Act, which requires employers to provide a place of employment free from recognized hazards that are causing or are likely to cause death or serious physical harm to employees.

OSHA Organization, Accident Investigation and Enforcement. The OSH Act encourages States to develop and operate, under Federal OSHA guidance, State job safety and health plans, including plans for hazardous materials. Once a State plan is approved, OSHA funds up to 50 percent of the program's operating costs, and the State's programs must be at least as effective as the Federal OSHA program. Twenty-five States (including two territories) have OSHA-approved programs. Twenty-three state plans cover both private and public sector employees. Two state plans cover public sector only.

OSHA investigates all serious workplace accidents involving chemical releases to determine whether there has been a violation of the OSH Act or of any regulations under that Act; and to determine whether changes are needed in the OSHA program.

Under the OSH Act, OSHA is authorized to conduct workplace inspections. OSHA inspections, in order of priority, include: imminent danger situations; to catastrophes and fatal accidents; employee complaints of violations of standards; and planned inspections of high of high-hazard or targeted industries, including the chemical industry. OSHA is also authorized to issue citations for violations of OSHA regulations and to assess penalties. In 1990 and 1991, OSHA issued unprecedented multimillion dollar penalties against several chemical companies which had willfully violated OSHA regulations. Section 4(b)(1) of the OSH Act is specifically designed to avoid duplication and overlap of federal safety and health regulations. Under section 4(b)(l), OSHA is preempted from applying its regulations to working conditions addressed by other federal agency regulations.

OSHA has placed increased emphasis on chemical accident prevention in the last two to three years. In 1990, OSHA initiated its Special Emphasis Program in the petrochemical industry (PetroSEP), by selecting 28 corporations for inspection. This program targeted corporations of more than 2,500 employers where most petrochemical facilities exist, within the three primary SIC Codes -- 2821 (plastic materials), 2869 (industrial organic chemicals), and 2911 (petroleum refineries). In addition, OSHA has increased its coordination with other federal agencies, in particular, with EPA, which led to a Memorandum of Understanding governing coordination, sharing information and data, and cooperating in certain enforcement actions in the PetroSEP program. OSHA has supported public and worker training programs at its training facility in Illinois, and has provided materials to the public.

OSHA Training. Although the Occupational Safety and Health Act of 1970 does not address specifically the responsibility of employers to provide safety and health training to employees, Section 5(a)(2) does require that each employer "...shallcomply with the ...standards promulgated under this Act." OSHA standards that contain training requirements for emergency prevention, preparedness, and response cooperations include the Process Safety Management Standard, mentioned above, the Hazardous Waste Operations and Emergency Response Standard (HAZWOPER), and the Hazard Communication Standard.

Under the Hazard Communication Standard, employers must establish a training and information program for employees exposed to hazardous chemicals in their work area at the time of initial assignment and whenever a new hazard is introduced. OSHA's HAZWOPER standard covers workers employed in clean-up operations at uncontrolled hazardous waste sites and at waste treatment, storage and disposal facilities licensed by EPA under the Resource Conservation and Recovery Act (RCRA). The standard also covers workers responding to emergencies, including those involving hazardous materials (e.g., spills). State, county and municipal workers such as police, ambulance workers, and firefighters with local fire departments, are covered by the regulations issued by the 23 states that have their own safety and health programs. EPA regulations cover such employees in the other states.

EPA Hazardous Materials Organization

EPA Organization. A number of different federal environmental statutes establish the regulatory framework for hazardous materials safety for communities and the environment. Safety programs and standards, which address prevention, have been included within statutory language that is often intended to address general environmental degradation, rather than accidents in particular. EPA authority for contingency planning and emergency response is primarily from specific language and statutes, e.g., CERCLA, EPCRA, and OPA, which also contain other provisions for long-term problems.

The organization of safety programs at EPA is complex. This is due, in part, to the Agency's current structure, which organizes programs by environmental medium, typically by statute, and in part to the fragmentation of safety provisions in multiple laws. The fragmentation occurs when organizational structures are designed to accommodate statutes while sometimes de-emphasizing management of programs by function.

EPA administers hazardous materials safety provisions primarily through two offices within its Office of Solid Waste and Emergency Response. These two offices are: the Chemical Emergency Preparedness and Prevention Office (CEPPO), and the Office of Emergency and Remedial Response (OERR). Each office manages programs under multiple statutes. CEPPO is primarily responsible for regulations and programs under the 1986 Emergency Planning and Community Right to Know Act (EPCRA), for accident prevention provisions under §112(r) of the Clean Air Act, for EPA's responsibilities under HMTUSA, and for overall emergency coordination within EPA, including acting as Chair of the National Response Team (NRT) and National Incident Coordination Team (NICT), the EPA intra-agency emergency coordination mechanism. OERR is responsible for regulatory and response functions required by CERCLA and SARA, and for EPA response to oil spill incidents under the Oil Pollution Act. Specific OERR responsibilities include: reviewing and approving facility Response Plans as required by the Oil Pollution Act (OPA), developing and writing revisions to the National Contingency Plan; developing prevention activities for fixed oil facilities under the Clean Water Act as amended by OPA; development of reportable quantities regulations; training for state and local first responders; developing and maintaining the Emergency Response Notification System; and response to oil spills and other emergencies in the inland zone. OERR also administers remedial programs under CERCLA.

In addition to its regulatory functions, CEPPO undertakes compliance and guidance programs under various statutory authorities. These programs are designed to support state and local planners and to encourage industry, states and local communities in improving accident prevention, preparedness, and response efforts. Among these efforts are its Accidental Release Information Program; the Chemical Safety Audit Program under CERCLA authorities, which assists industry through facility visits in improving safety

practices, technologies and techniques; and CAMEO, the EPA/NOAA computer software designed to aid in emergency planning and response at the state and local levels.

Two other offices within the Office of Solid Waste and Emergency Response have significant responsibility with respect to hazardous materials that affect safety. The Office of Solid Waste is responsible for developing and administering standards under RCRA. Permitting standards for hazardous waste management facilities, for instance, serve to reduce the probability of accidents. Similarly, the Office of Underground Storage Tanks develops and manages technical standards under Subtitle I of RCRA for underground storage of oil and hazardous substances. Both offices also manage corrective action programs for solid waste management units and leaking underground storage tanks.

The Office of Pesticides, Prevention and Toxic Substances manages EPA's system of registering new chemicals for commercial use under authority of the Toxic Substance Control Act (TSCA), and annually tracks emergency and non-emergency toxic releases as required by EPCRA through the Toxic Release Inventory. Through a registration system for potentially new chemical products, EPA receives some 3,000 to 4,000 premanufacturing notices annually. TSCA also requires immediate notification when accidental releases of a toxic chemical present a substantial risk of injury to health or the environment. This office is also responsible for administering programs under the Federal Insecticide, Fungicide, and Rodenticide Act with regard to pesticide safety and worker protection.

EPA's Office of Air and Radiation manages programs under the Clean Air Act and leads the EPA response to radiological accidents under the FRERP. Also, through the FRERP, OAR leads the federal response to accidents involving naturally-occurring and accelerator-produced radioactive materials and foreign sources of radiological materials. Recent examples are the 1979 crash of the USSR's nuclear powered COSMOS satellite in Canada, and the 1986 Chernobyl nuclear reactor accident in the Ukraine. Although the FRERP was not activated for these incidents, using the most recent revisions it would be for similar incidents. For smaller radiological incidents which do not require a coordinated federal response, this Office responds with the Office of Solid Waste and Emergency Response using the National Contingency Plan, as occurred in the clean-up of a radium chemical company in Bronx, NY. The Office of Air Quality Programs and Standards develops and implements technical standards under the Clean Air Act to prevent or reduce emergency and non-emergency releases of hazardous materials. Like RCRA standards, those air standards serve, by regulating industry practices, to reduce the probability that accidents will occur.

The Office of Water at EPA, the regional offices, and delegated states, using Clean Water Act authority, establish permitting requirements, and set standards to control the release of pollutants to surface water and to municipal wastewater treatment plants. This Office also contributes to response actions that affect wetlands, coastal areas, and oceans, and overseas implementation of the Safe Drinking Water Act.

As addressed in more detail in Chapter 4, numerous statutory and non-statutory lists of hazardous materials are managed by EPA programs. These lists form the way EPA requirements for accident prevention, preparedness, and response are developed and implemented. The lists, however, have multiple purposes and contain different listed materials based on varying criteria and statutory mandates. All of the Offices described manage lists. These lists do not currently serve an integrated function in terms of data management or regulatory development for accident safety. EPA is developing an electronic Registry of Lists under its Office of Policy, Planning and Evaluation to facilitate integration.

Most of EPA's prevention, preparedness, and response regulations, programs and activities require technical expertise and support for development and implementation. In addition, DOT draws on EPA expertise and information in the development of some of its regulations, particularly for hazard classification.

EPA Regional Organization and Enforcement. Within the ten EPA regional offices, implementation of hazardous materials safety provisions mentioned above is typically divided differently among offices. Regional Administrators have primary responsibility for implementing how their region will administer new regulations and programs. Typically, the regions will assign implementation authority to a media office responsible for a given statute. Because hazardous materials safety regulations have been promulgated

under a variety of laws, it is increasingly awkward for EPA to administer its safety programs at the regional level, as well as at headquarters, with its current organizational structure.

EPA statutes also include clauses pertinent to adoption of its laws and/or regulations by the states. EPA statutes generally allow states' adoption and expansion of environmental statutes, provided that the federal standards are the minimum. Unlike the funding programs for the states used by OSHA, federal funding may or may not be provided to the states for implementation.

EPA Training. Training courses for first responders are offered by the Environmental Response Team and through the Regional programs. EPA participates with FEMA, OSHA, and DOT, among others on the Training Committee of the National Response Team in the review and development of courses for contingency planning and responses. Further, EPA develops courses to implement its prevention responsibilities.

Nuclear Regulatory Commission (NRC)

The Nuclear Regulatory Commission controls the handling of nuclear materials through an extensive licensing and regulatory program. This program includes several different requirements for responsible parties to immediately report releases of radionuclides.

The extent of the Commission's regulatory jurisdiction is limited to certain types of nuclear materials and to certain parties who may handle these materials. First, the Commission only licenses source, byproduct, and special nuclear material as defined by the Atomic Energy Act. The Commission does not license naturally-occurring and accelerator-produced radioactive materials, although exposure to naturally-occurring radioactive materials may be subject to Commission regulation when they are associated with sources, byproduct, or special nuclear material being used under an active license. Second, the Atomic Energy Act exempts certain activities of the Department of Energy and the Department of Defense involving source, byproduct, and special nuclear materials from Commission license requirements.

The Nuclear Regulatory Commission exercises its statutory authority by imposing a combination of design criteria, operating parameters, and license conditions at the time of construction and licensing. It assures that the license conditions are fulfilled through inspection and enforcement. The Nuclear Regulatory Commission and the states that have entered into agreement with the Nuclear Regulatory Commission to assume the regulations of certain programs license more than 20,000 users of radioactive materials.

The NRC and the Department of Transportation (DOT) share responsibility for regulating the transportation of licensed radioactive materials. The NRC regulates the design, construction, use, and maintenance of packagings for larger quantities of radioactive materials. The DOT regulates the carriers of radioactive material, and requires carriers to report to DOT any suspected radioactive contamination involving shipment of radioactive material. The NRC is also responsible for regulating the safeguarding of designated shipments to assure security of nuclear material against theft or sabotage.

Bureau of Alcohol, Tobacco, and Firearms (ATF), Department of Treasury

The Bureau of Alcohol, Tobacco, and Firearms (ATF) has the authority under 18 U.S.C. 40 "to protect commerce from interruption by reducing the hazards to persons or property arising from the misuse and unsafe or insecure storage of explosives." ATF regulates "any chemical compound mixture or device having a *common or intended* (emphasis added) purpose of functioning by explosion" by licensing manufacturers. The Bureau also prescribes by regulation the configuration, construction, and location of storage magazines. Section 846 of 18 U.S.C. authorizes the Bureau to inspect any accident or fire when there is any reason to believe that explosive materials were involved. The Bureau maintains four teams and responds within 24 hours of an incident. ATF coordinates closely with DOT and DOD on classification of explosives, and with other appropriate agencies on storage.

Federal Emergency Management Agency (FEMA)

The Federal Emergency Management Agency (FEMA) provides extensive guidance, technical and/or financial assistance to State and local governments for emergency preparedness activities which include: planning, training, exercising, mitigation, and information sharing. Under Presidential Executive Order, FEMA has the responsibility to establish overall policies for emergency planning by Federal agencies. It may assess the plans of those agencies and may recommend to the President changes, if necessary.

FEMA is a member of the National Response Team and the Regional Response Teams, which coordinate hazardous materials emergency preparedness, response, and assistance activities among federal agencies, States, and local governments. FEMA may provide advice and assistance to the on-scene coordinator during an emergency regarding temporary or permanent relocation of citizens. FEMA administers the Emergency Broadcast System and a National Warning System which are used by governors and mayors to warn of disasters and communicate with the community in natural and technological emergencies. FEMA also administers an extensive program for emergency management training of State and local personnel through its Emergency Management Institute. Eighteen programs, currently managed under FEMA's Comprehensive Cooperative Agreement (CCA) provide funding and technical assistance to State and local governments for emergency management. Five of these programs provide for technical assistance only. FEMA also supports EPA in the implementation of activities under the Emergency Planning and Community Right to Know Act and DOT under the Hazardous Materials Transportation and Uniform Safety Amendments of 1990.

The U.S. Fire Administration within FEMA, coordinates federal activities related to fire protection in the following areas: fire policy and coordination, firefighter health and safety, fire data and analysis, and fire prevention and arson control. USFA works with federal, State and local governments, fire service organizations, and the private sector to minimize losses of life and property. The USFA may investigate major fire incidents to make recommendations concerning fire safety and prevention. The USFA also provides hazardous materials response training to firefighters.

Federal Facility Programs and Activities for Hazardous Materials Safety

Significant to any discussion of the hazardous materials safety system are the prevention, preparedness, and response roles of agencies and departments who manage and control the nation's extensive land holdings and facilities. Following are discussions of the various agency responsibilities for their own hazardous materials safety.

Department of Energy (DOE)

The Department of Energy (DOE) carries out most of its operations through government-owned, contractor-operated facilities and laboratories at the field level. Management of DOE field operations are the responsibility of DOE's eight Field Elements, which provide a formal link between DOE Headquarters Program Offices and the laboratories and operating facilities.

DOE regulates its internal activities and operations through a series of DOE Orders. DOE currently maintains an array of Orders that establish the Department's policies, requirements, and standards. In many cases, these Orders incorporate by reference, and supplement requirements derived from EPA, DOT, DOL, OSHA, and state regulations. DOE program offices are responsible for ensuring that operations under their responsibility are in compliance with the DOE Orders and other federal and state regulations, which apply to DOE's contractors as well as DOE employees.

DOE's Emergency Management System. DOE's procedures and responsibilities for addressing the prevention and mitigation of releases of hazardous materials are set forth in the Department's Emergency Management System (EMS). The goal of the EMS is to respond to emergencies in a timely, efficient, and effective manner to mitigate accident consequences. DOE divides emergencies into three categories. Energy emergencies refer to emergencies affecting the supply of energy or energy facilities critical to the national

security or the public health and safety. Continuity of Government emergencies refer, as its name suggests, to emergencies involving national security threats to the continuity of the federal government. Operational emergencies (which are the focus of the information provided hereafter) are significant radiological and non-radiological accidents, incidents, events, or natural phenomena associated with the serious degradation of safety or security at a DOE owned or leased facility, operation, or activity. Operational emergencies apply to all DOE facilities, including DOE reactors, other DOE nuclear and non-nuclear facilities involved with hazardous materials, DOE-controlled nuclear weapons, components, or test devices, and transportation accidents involving hazardous material under DOE control. DOE's EMS is developed and maintained to ensure adequate response to those accidents or incidents involving releases of hazardous materials

DOE's Implementing Authorities. In May 1991, DOE issued several Orders (5500-series) that extensively revised the EMS. These revisions were prompted by new initiatives from the Secretary of Energy to improve the emergency preparedness and response capabilities, as well as changes to organizational missions and functions of the Department. In these revisions, DOE included emergency management requirements for non-radiological materials comparable to those for radionuclides.

Other sections in this report summarize DOE policies and/or requirements of DOE Orders as they pertain to release planning and preparedness, notification and response, and coordination and technical assistance.

Defense Nuclear Facilities Safety Board

The Defense Nuclear Facilities Safety Board was established in the National Defense Authorization Act for fiscal year 1989. The agency's mission is to make specific recommendations to the Secretary of Energy and the President aimed at ensuring that public health and safety are adequately protected at the Department of Energy's defense nuclear weapons facilities located throughout the United States. The Board reviews and evaluates DOE's safety standards; investigates activities at facilities which may adversely affect the public health and safety; holds public hearings; reviews the design and construction of new defense nuclear facilities and analyzes data from any defense nuclear facility.

Department of Defense (DOD)

The Department of Defense (DOD) is one of four federal agencies which have specific response responsibilities in the event of a chemical release. DOD is responsible for hazardous materials safety, including prevention, preparedness, and response, for facilities and lands under its jurisdiction. If DOD facilities, vessels or chemicals are involved in a release, the DOD is responsible for providing On-Scene Coordinators (OSCs) and taking charge of response actions for releases of hazardous substances at facilities under its jurisdiction. DOD also serves as a member of the National Response Team and may assist other agencies involved in a hazardous materials incident. The Conservation Programs on Military Reservations (Sikes) Act requires each military department to manage natural resources on its installations. Under the National Contingency Plan, each installation is responsible for protecting its natural resources from any environmental releases of hazardous materials, including those caused by a non-DOD entity.

DOD's Implementing Authorities. Since the 1970's DOD has issued several Directives to implement hazardous materials safety planning, prevention, preparedness, and response programs. These Directives pertain to control of wastewater discharges, air emissions, and solid waste disposal, as well as laying out policies and procedures for pollution prevention and implementation of the National Contingency Plan. Each military service has also issued specific regulations, instructions, or orders which require each installation to establish hazardous materials safety programs.

In addition, DOD has special responsibilities for explosives under its jurisdiction. The Department of Defense Explosives Safety Board has the authority under 10 U.S.C. 172 to "establish uniform safety standards applicable to the exposure of United States titled ammunition and explosives to associated and unassociated personnel and property resulting from the potential damaging effects of an accident during development, manufacture, testing, transport, handling, storage maintenance, demilitarization and disposal."

Another ongoing DOD program jointly administered with FEMA, is the Chemical Stockpile Emergency Preparedness Program (CSEPP) which addresses, among other things, community protection through contingency planning surrounding those facilities storing chemical warfare weapons. Each Army chemical weapon storage site exercises its Initial Response Force annually and conducts exercises to test the Chemical Stockpile Emergency Preparedness Program. In addition, the larger Service Response Force, capable of responding to Army chemical incidents anywhere in the continental United States, conducts exercises biennially.

The Defense Nuclear Agency (DNA) has summarized procedural guidance, technical information, and DOD responsibilities for responding to an accident involving nuclear weapons.

Department of Agriculture (USDA)

The mission of the USDA and its concern for hazardous materials safety stem from several factors:

- Its natural resource trustee responsibilities for protecting vast National Forest lands and resources through the Forest Service;

- Its specific divisions that conduct activities related to hazardous materials including:

  - The Agricultural Research Service which conducts research, particularly on pesticides, in support of agricultural programs;
  - The Extension Service, which provides information, training, and education programs for farmers, including pesticides information; and
  - The Soil Conservation Service which carries out a national soil and water conservation program; and

- Its participation on the National Response Team.

In addition to its mission, the USDA agencies own thousands of buildings, many of which are used for administrative and housing purposes. However, some USDA facilities, such as research and laboratory facilities, or fueling and maintenance facilities, use hazardous materials. While significant, or reportable, quantities of these materials are typically not used or stored, accidental releases or discharges of small quantities could be of concern in some areas which may impact sensitive environments. As a part of its incident command system for forest fires, the Forest Service also may use its trained personnel including environmental engineers if needed for hazardous materials incidents.

Department of the Interior (DOI)

The DOI is the largest landholder in the United States. Owning millions of acres on behalf of the United States, it is responsible for managing about one-fifth of the nation's surface area. DOI is also a trustee of millions of additional acres of Indian trust lands. In addition, DOI holds about one-third of the nation's total subsurface and mineral estates in trust for the public.

In addition to environmental responsibilities based on its landholdings, DOI has responsibilities for certain types of natural resources wherever they occur, including birds, fishes, and certain mammals. Because of its historical missions, DOI therefore has a wide range of technical and scientific expertise in environmental matters which make its Bureaus and Offices valuable partners in many situations involving emergency responses.

The DOI participation in hazardous materials management and incident response involves several Departmental units. Overall Departmental coordination is managed by the Office of Environmental Affairs (OEA) in the Office of the Secretary, and individual Bureaus have roles related to their program missions or expertise.

Three of the seven OEA divisions have significant roles. The Hazardous Materials Management Division coordinates internal Departmental policy on the handling of hazardous materials, and cleanup of contaminated sites on Departmental lands. the Natural Resources Trust and Response Division provides support to the NRT and its committees, acts as a Departmental focal point in communications in oil and hazardous materials incident response, and oversees the Department's activities in response situations related to protection and rehabilitation of resources for which DOI is trustee. The Energy Division coordinates Departmental policy and response for incidents involving radionuclides.

Two other divisions coordinate response to other disaster situations that may involve hazardous materials concerns. The Minerals Division is responsible for Departmental policy in liaison with and implementation of the Federal Response Plan, and oversees Departmental response to geologic related natural disasters such as volcanic eruptions and earthquakes. The Water Division oversees Departmental response to climatic natural disasters such as hurricanes and major floods.

The OEA has Regional Environmental Officers in nine regional offices that provide support to and Departmental liaison with the RRTs, serve as an incident notification focal point, and coordinate response efforts of the regional staff of involved Bureaus of the Department.

Of the ten major Bureaus and Offices of the Department, seven have significant roles in hazardous materials incident response, both within their areas of jurisdiction, and in providing technical assistance. The Fish and Wildlife Service is responsible for protection of wildlife resources for which there is a Federal trust responsibility, such as migratory birds and certain anadromous fish, endangered species, and marine mammals. They also can provide expert advice in such areas for both response planning and in incident response. The U.S. Geological Survey provides technical information on geologic and hydrologic resources affected, and techniques for handling certain hazardous materials in the environment. The Bureau of Mines has expertise and experience in handling, stabilizing, and extracting certain hazardous mineral resources. The Minerals Management Service is responsible for oil and gas leasing and operations in offshore areas, and has expertise and oversight responsibility in incident response in those areas. The Bureau of Land Management has similar leasing and operations responsibilities on certain public lands. The National Park Service provides expertise in resource concerns related to parks and other protected natural and cultural areas. The Bureau of Indian Affairs has expertise in issues related to incident responses involving the Indian trust responsibilities of the Department.

These Bureaus are also concerned with effects of incidents on lands under their jurisdiction such as National Wildlife Refuges, National Parks, other public lands, and major federal lands around water projects. The Bureau of Indian Affairs also provides assistance to Indian Tribes in responses to incidents on their lands.

Another interagency response entity with significant Department involvement is the Boise Interagency Fire Center. This is the national logistical center for state and federal fire suppression agencies. Recently, they have become increasingly involved with "all risk" situations such as the response to recent hurricanes Hugo, Andrew, and Iniki, the Mount St. Helens eruption, the Three Mile Island radiation release, and other similar incidents. The Center is operated by the Bureau of Land Management, along with fire and aviation management personnel from other Bureaus and the U.S. Forest Service. The National Weather Service provides fire weather forecasting services to the Federal and State agencies involved in a response. Of increasing concern recently is management of responses to and investigations of fires involving hazardous materials.

NON-REGULATORY AGENCY SUPPORT AND PROGRAMS FOR HAZARDOUS MATERIALS SAFETY

Other Federal departments and agencies provide important input into and support for federal, state and local prevention functions.

National Oceanic and Atmospheric Administration (NOAA)

NOAA activities for hazardous materials focus in three areas: scientific support during emergency responses and remedial actions; research on the fate and effects of hazardous materials, including new technology development; and assessment of damages from releases of oil and hazardous materials. Through its regionally located Scientific Support Coordinators, NOAA provides scientific support to the U.S. Coast Guard On-Scene Coordinator for releases of oil and hazardous materials in the coastal zone. NOAA also has regionally located Coastal Resource Coordinators who provide technical advice to EPA's Regional Project Managers during removal or remedial actions as well as general advice on pollution impacts from waste sites to fisheries, marine mammals, endangered species, and the coastal environment. NOAA also conducts research and monitoring programs on the fate, behavior, and effects of pollutants in the marine environment; develops new technologies such as the NOAA/EPA Computer Aided Management of Emergency Operations (CAMEO ™) program; and on behalf of the Secretary of Commerce acts as a Federal trustee for living and non-living natural resources in coastal and marine areas. In carrying out this responsibility, NOAA conducts damage assessments of the environmental and economic impact of releases of oil and hazardous materials in order to collect moneys to restore such environments and their resources.

General Services Administration (GSA)

GSA supplies other federal agencies with certain hazardous materials, such as solvents, some of which are stored in GSA warehouses. GSA complies with the regulations for the safe storage, use, and transportation of these materials until they reach the customer, who then assumes responsibility. In many cases, in order to minimize environmental risks and costs for storage and processing, GSA does not store the materials, but simply forwards orders to suppliers, who deliver the materials to the customer agencies. Some hazardous materials, such as paints and cleaning agents, are used by GSA to operate and maintain its facilities. In this capacity, it ensures that its employees and contractors comply with hazardous material and hazardous waste regulations. Tenant agencies in GSA controlled facilities are responsible for the storage, use, and disposal of their hazardous materials.

Department of Health and Human Services (HHS)

The department of Health and Human Services (HHS assists with the assessment, preservation, and protection of human health and helps ensure the availability of essential human services. HHS provides technical and nontechnical assistance in the form of advice, guidance, and resources to other federal agencies as well as state and local governments.

The principal HHS response comes from the U.S. Public Health Service and is coordinated from the Office of the Assistant Secretary for Health, and various Public Health Service regional offices. Within the Public Health Service, the primary response to a hazardous materials emergency comes from the Agency for Toxic Substances and Disease Registry (ATSDR) and the Centers for Disease control CDC). Both ATSDR and CDC have a 24-hour emergency response capability wherein scientific and technical personnel are available to provide technical assistance to the lead federal agency and state and local response agencies on human health threat assessment and analysis, and exposure to hazardous materials, and technical advice on mitigation and prevention. Such assistance is used for situations requiring evacuation of affected areas, human exposure to hazardous materials, and technical advice on mitigation and prevention. CDC takes the lead during petroleum releases regulated under the Oil Pollution Act while ATSDR takes the lead during chemical releases under CERCLA/SARA. Both agencies are mutually supportive.

Other Public Health Service Agencies involved in support during hazardous materials incidents either directly or through ATSDR/CDC include the Food and Drug Administration, the Indian Health Service, and the National Institutes of Health.

The Agency for Toxic Substances and Disease Registry (ATSDR). The ATSDR assists EPA, the NRT and the RRTs, in preparedness and response under CERCLA authorities for hazardous substances and during emergency releases. ATSDR maintains regional representatives in each of the ten EPA regional

offices. These people assist in emergencies by identifying such factors as toxic effects, necessary actions regarding acute and potential long term effects from accidents, and providing advice to the medical community during an emergency. In addition, ATSDR undertakes various research projects related to health effects from hazardous materials accidents. Organizationally, the ATSDR is the coordinating agency within the Public Health Service for obtaining assistance from other PHS agencies. In this regard, the Centers for Disease Control, FDA, and other PHS agencies provide assistance during emergencies.

National Institute for Occupational Safety and Health (NIOSH). NIOSH conducts research on various safety and health problems, provides technical assistance to OSHA, and recommends standards for OSHA's adoption. While conducting its research, NIOSH may make workplace investigations, gather testimony from employers and employees and require that employers measure and report employee exposure to potentially hazardous materials. NIOSH may also require employers to provide medical examinations and tests to determine the incidence of occupational illness among employees. In formulating its recommendations, NIOSH evaluates all known and available medical, biological, engineering, chemical, trade and other information relevant to the potential hazard. Their recommendations are transmitted to OSHA and the Mine Safety and Health Administration for use in promulgating standards.

Department of Justice (DOJ)

The DOJ's Environment and Natural Resources Division is responsible for criminal and civil suits and matters in the federal district courts, in the state courts, and in the U.S. Court of Federal Claims relating to real property and to the protection of the environment. Litigation responsibilities include actions to protect water and other natural resources, to abate air, water, and hazardous waste pollution, and to recover damages caused by hazardous materials releases.

The Environmental Protection Unit is comprised of the Environmental Crimes, Environmental Defense, Environmental Enforcement, and Wildlife and Marine Resources Sections. The Environmental Crimes Section prosecutes criminal violations of environmental protection statutes, such as the CAA, CWA, RCRA, and TSCA. The Environmental Defense Section defends rule-making, regulatory, and permit actions made by the EPA, USCG, and Army Corps of Engineers. It also represents federal facilities sued for violations of environmental laws. The Environmental Enforcement Section conducts civil enforcement litigation to control and abate pollution and to recover natural resource damages on behalf of other federal agencies. The Wildlife and Marine Resources Section defends federal regulations concerning wildlife and plants.

Department of State (DOS)

The Department of State serves as a member of the National Response Team and maintains unique responsibilities for coordination of the international aspects of hazardous materials emergencies, as well as providing expertise and guidance regarding international matters pertinent to hazardous materials accident prevention, preparedness, and response. Specifically, DOS is concerned with coordinating international cooperation, ensuring such cooperation when an issue or emergency event has transboundary implications, and taking a leadership role in international conferences pertaining to accident prevention, preparedness, and response.

FINDINGS

In examining these laws, and the specific types of safety provisions they contain, several findings can be made.

- When viewed in the composite, these laws and regulations comprise a complex system of prevention, preparedness, and response measures for hazardous materials at any phase of the life cycle of a hazardous material.

- Similarities exist in the regulatory regimes of EPA, DOT, and OSHA in the areas of hazard classification systems; information dissemination and collection; inspection, enforcement and compliance programs; states' administration of federal initiatives; and worker protection requirements. However, these similarities exist not so much in the specifics of the laws or regulations, but in the fact that certain issues have been addressed by each regulatory agency. Specific regulations implemented by the various agencies, while addressing similar subjects, may differ widely.

- Environmental statutes address prevention, preparedness, and response measures. Technical and scientific expertise are required for the development and implementation of these different safety components. Because provisions that impact safety are spread across a number of statutes, responsibilities for developing and implementing safety policies and programs are dispersed, particularly across EPA offices, as well as among other federal agencies. This affects internal EPA coordination as well as interagency coordination.

- The primary thrust of hazardous materials transportation statutes is toward prevention and the ability of response personnel to identify hazards, should an accident occur. Technical assistance and expertise are required in the development of many transportation prevention measures.

- Statutes guiding the work of the U.S. Coast Guard focus on prevention, preparedness, and response, and require certain types of technical expertise in the development and implementation of regulations and programs.

- Worker protection statutes are oriented toward prevention, information dissemination, and accident investigation. Technical assistance from NIOSH may be used in the development of prevention standards.

- In some instances, the focus of environmental and worker protection programs and regulations are similar in that citizen and employee protection are paramount, and in the "right-to-know" premise underlying the statutes and programs implemented by each.

- Emergency management authorities have been used for all hazards planning and preparedness since 1954, following enactment of the Federal Civil Defense Act. Agencies including the Nuclear Regulatory Commission and the DOD have agreements to utilize FEMA's planning and preparedness infrastructure to enhance preparedness in sensitive areas and the communities surrounding commercial nuclear power plants and chemical weapons storage sites. Coordination and inclusion of the existing hazardous materials plans, (i.e., the NCP and the FRERP) was accommodated in the development of the Federal Response Plan.

- Some statutes require coordination among federal agencies. Agencies and departments have also entered into Memoranda of Understanding on a host of necessary safety provisions. Most environmental statutes are implemented by EPA; although some laws, for example CERCLA, RCRA and CAA, also contain provisions that are developed or implemented by DOT, the USCG, and OSHA.

- Prior to the development of this report, a forum for information sharing regarding prevention programs and regulatory matters, other than OMB, did not exist. The NRT has recently created such a forum, which is discussed in Chapter 4.

APPENDIX 3-A

SUMMARY OF ENVIRONMENTAL PROTECTION AGENCY REGULATIONS FOR HAZARDOUS MATERIALS SAFETY: TITLE 40 OF THE CODE OF FEDERAL REGULATIONS

CAA

Part 68 (to be proposed) -- Accidental release prevention regulations, including list of "regulated substances," threshold quantities, risk management program requirements for stationary sources that exceed thresholds for regulated substances; risk management program requires sources to develop offsite hazard assessment, an accident prevention program, and a response program.

Part 70 -- Implements CAA §503(2) which requires state operating permit programs to require sources to "promptly report any deviations from permit requirements to the permitting authority." These permit requirements could include emission limits on hazardous pollutants controlled under CAA §112.

CWA

Section 301 of the CWA prohibits the discharge of a pollutant to navigable waters except in compliance with a permit under the act. These permits incorporate limitations on pollutant discharges, including storm water discharges, from industrial, commercial, and public sources of wastewater. Section 307 establishes a list of toxic pollutants. Each of these pollutants is subject to effluent limitations and pretreatment standards. It also requires the Administrator to promulgate pretreatment standards to prevent the discharge of any pollutant which could interfere with, pass through, or be incompatible with a publicly owned treatment works. In addition, §311 prohibits the discharge of oil or hazardous substances into navigable water, the adjoining shoreline, or the contiguous zone. Violations of these requirements subject the violator to enforcement actions. §504 authorizes emergency action where any pollution source or combination of sources is presenting an imminent and substantial endangerment to health or welfare. The regulations implementing these provisions are as follows:

Part 112 -- Oil pollution prevention planning requirements, under CWA.

Parts 116 and 117 -- List of hazardous substances and reportable quantities for CWA §311.

Parts 122 and 125 -- National Pollutant Discharge Elimination System (NPDES) regulations which include permit requirements and conditions to control, prevent, or minimize releases of pollutants.

Part 300 -- National Contingency Plan (see CERCLA discussion, below)

Parts 401 - 471 -- Effluent guidelines for source categories, including, as appropriate, best management practices to control discharges.

RCRA

Part 260 -- General overview of hazardous waste regulatory program, definitions, and procedures for handling rulemaking petitions.

Part 261 -- Definitions of hazardous and solid wastes and exceptions; criteria for determining whether a waste is hazardous due to its "characteristic;" specifically listed hazardous wastes.

Part 262 -- Standards for generators of hazardous waste, including tracking "manifests" and packaging/labeling standards consistent with DOT/HMTA standards, as well as recordkeeping, exception reporting, and export/import requirements for shipments.

Part 263 -- Standards for transporters of hazardous waste, including manifest requirements and spill cleanup and reporting requirements consistent with DOT standards.

Parts 264, 265 and 266 -- Standards for hazardous waste treatment, storage, and disposal facilities (TSD) and certain recycling facilities, including security, preparedness, prevention, release contingency planning and emergency response procedures, release monitoring requirements, financial assurance, and requirements for hazardous waste management unit structural integrity.

Part 270 -- Standards for TSD permits, including location information, contingency plans, and release prevention.

Part 280 -- Technical standards and corrective action requirements for underground storage tanks (USTs), including release detection, reporting, and response requirements and financial assurance for petroleum UST corrective action and third party liability.

EPCRA

Part 355 -- Community emergency planning and release notification standards for facilities that have present listed "extremely hazardous substances," including follow-up release notification requirements.

Part 370 -- Annual facility hazardous chemical inventory reporting to state and local emergency planners and fire departments.

Part 372 -- Annual toxic chemical release reporting.

CERCLA

Part 300 -- "National Contingency Plan" for oil, hazardous substance, pollutant, and contaminant response, including organization and responsibility provisions, planning and preparedness standards, oil removal procedures, and hazardous substance discovery and response action standards.

Part 302 -- Designation of hazardous substances and reportable quantities; release notification requirements.

TSCA

Parts 720 - 721 -- Procedures for reporting new chemical substances and significant new uses of chemical substances.

Part 761 -- Prohibitions and requirements for polychlorinated biphenyls (PCBs) and PCB items, including PCB spill cleanup policy and financial assurance.

Part 763 -- Management and response action requirements for asbestos-containing materials in schools.

1978 Policy Guidance for TSCA 8(e) reporting - provides guidance on reporting risk information to EPA.

SDWA

Part 142 -- Requirements for state implementation of drinking water regulations, including state plans for providing drinking water for emergency circumstances.

FIFRA

Parts 150 - 155 -- Requirements relating to pesticide registration.

Part 156 -- Labelling requirements for pesticides, including storage and disposal.

Part 165 -- Recommended procedures for disposal and storage of pesticides and pesticide containers.

Part 168 -- Notification of banned pesticide inventories

Part 170 -- Training of workers/hazard communication

SUMMARY OF U.S. DEPARTMENT OF TRANSPORTATION HAZARDOUS MATERIALS REGULATIONS IN TITLE 49 OF THE CODE OF FEDERAL REGULATIONS

Part 106 prescribes general rulemaking procedures for adopting Office of Hazardous Materials Transportation regulations.

Part 107 contains procedures for the submission and review of packaging exemption applications, inconsistency rulings, and non-preemption determinations. Enforcement authorities are also described.

Part 171 is a general introduction to the hazardous materials regulations. Special requirements for hazardous wastes are included, as well as definitions of terms and a list of technical documents incorporated by reference into the regulations. Reporting requirements for hazardous materials accidents are also specified.

Part 172 contains the Hazardous Materials Table. The table lists the hazardous materials and hazard classes subject to regulation; appropriate requirements for labels, packaging, and air and water shipments are referenced. In addition, Part 172 includes detailed regulations for shipping papers, markings, labels, and placards.

Part 173 indicates the types of packaging that may be used by shippers of hazardous materials. General shipment and packaging regulations are followed by more specific requirements for certain hazard classes. Hazard class definitions are also contained in Part 173.

Part 174 prescribes regulations for rail transport. General operating, handling, and loading requirements are specified, as well as detailed requirements for certain hazard classes.

Part 175 applies to passenger and cargo aircraft shipments of hazardous materials. The regulations include quantity limitations, loading and handling requirements, and special requirements for certain hazard classes.

Part 176 addresses non-bulk transportation of hazardous materials by waterborne vessels. Requirements for accepting freight, handling, loading, and stowage are prescribed. Coast Guard regulations for bulk shipments of hazardous materials are contained in Title 46 of the Code of Federal Regulations.

Part 177 contains regulations for the highway mode; they apply to common, contract, and private carriers. In addition to regulations for handling, loading, and stowage, routing rules for high-level radioactive materials and other in-transit requirements are specified.

Part 178 presents detailed specifications for the fabrication and testing of packaging described in Part 173.

Part 179 prescribes detailed specifications for rail tank cars. Procedures for obtaining Association of American Railroads approval of new tank car designs or changes to existing ones are provided.

Part 180 Qualifications and maintenance of cargo tanks. This subpart prescribes requirements applicable to any person responsible for the continuance of qualification, maintenance or periodic testing of a cargo tank.

Part 172-177 — revised on May 15, 1992, to establish training requirements for all hazardous materials employees.

PIPELINE SAFETY REGULATIONS
TITLE 49 CODE OF FEDERAL REGULATIONS

Part 190 Subparts A & B	Outlines purpose and scope of RSPA Office of Pipeline Safety duties; includes definitions, enforcement authorities, compliance orders, civil penalties, criminal penalties and specific relief.
Part 191	Reporting accidents and safety-related conditions for pipelines, specially release of natural and other gas by pipeline. Annual reports, incident reports and safety related condition reports (written and telephonic).
Part 192 Subparts A - M	Transportation of Natural and Other Gas by Pipeline, including scope and definitions; materials; pipe design; pipeline component design; welding of steel pipelines; joining of materials other than by welding; general construction requirements; customer meters, service regulators and service lines; requirements for corrosion control; and maintenance.
Subpart I	Also includes damage prevention programs, emergency plans, and investigation of failures.
Part 195	Transportation of hazards liquids by pipelines and reporting accidents and other safety-related conditions (written and telephonic reporting).

SUMMARY OF U.S. COAST GUARD REGULATIONS FOR HAZARDOUS MATERIALS SAFETY: TITLES 33, 40, 46, AND 49 OF THE CODE OF FEDERAL REGULATIONS

33 CFR

Part 6 — Provides protection and security of vessels, harbors, and water port facilities.

Parts 126 and 127 — Regulations for proper handling of dangerous cargoes at dry bulk waterfront facilities.

Part 153 — Oil and hazardous substances discharge and removal.

Part 154 — Regulations guiding facilities transfers of oil or hazardous materials in bulk liquid.

Part 155 — Oil or hazardous material pollution prevention regulations for vessels.

Part 156 — Oil and hazardous materials transfer operations

Part 157 — Tank vessels carrying oil in bulk

40 CFR

Part 109 — Oil removal contingency plans, state, local regional

Part 112 — Onshore, offshore facilities pollution prevention

Part 300 — National Contingency Plan

46 CFR

Part 6 — Vessel inspection authority

Part 7 — Details boundaries of coast Guard jurisdiction and specifies requirements for waivers to inspection laws and regulations

Part 40 — Special construction, arrangement for tank vessels carrying certain flammable or combinations of dangerous cargoes in bulk

Part 98 — Special construction, arrangement for certain dangerous cargoes in bulk

Part 99 — Special construction for nuclear vessels

Part 147 — Carriage of hazardous materials as ship's stores

Part 147A — Shipboard fumigation

Part 154 - Safety standards for self-propelled vessels carrying bulk liquid gases

Part 148 — Carriage of solid hazardous materials in bulk on vessels

Part 151 — Barges carrying bulk liquid hazardous materials cargo

Part 153 — Ships carrying bulk, liquid gas or gas comp. hazardous materials

Part 162 — Vessel pollution prevention equipment design and approval

49 CFR Part 173 — Shipping radioactive materials

Subchapter C — Shipping commercial explosives

Parts 171-176 — Shipping explosives

Oil Pollution Act (OPA) Provisions

Double Hull Requirements: Regulations published to carry out section 4115(a) define the protective spaces that make up a double hull. The Coast Guard published an Interim Final Rule (57 FR 36222 of 8/12/92) that provides standards for double hull construction. Design standards in this Interim Final Rule may be used immediately. Public comment on this rule is open until October 13, 1992. The Coast Guard has completed four studies on double hulls which are being consolidated into a final report to be published in the fall of 1992.

Overfill devices: Section 4110 requires overfill devices and minimum standards to warn of tank overfills on vessels that carry oil as cargo. The Notice of Proposed Rule Making (NPRM) and the regulatory evaluation are in draft stages. The Environmental Assessment has been completed.

Existing Tank Vessel Requirements: Section 4115(b) requires rulemaking for existing vessels without double hulls over 5,000 gross tons that provide substantial protection to the marine environment and are economically and technologically feasible. The Coast Guard is drafting an NPRM based on comments received from the Advance Notice of Proposed Rulemaking (ANPRM) (56 FR 56284 of November 1, 1991). The ANPRM discussed the structural and operational measures under consideration for rulemaking. The Coast Guard is also considering revised draft regulation 13 G of Annex I of MARPOL 73/78.

Periodic Gauging of Plating Thickness: Section 4109 requires periodic gauging of hull plates on vessels that are more than 30 years old. The Coast Guard is also required to establish minimum standards for plating thickness on new vessels. These new standards are still under development.

Suspension and revocation of licenses: Section 4103 of OPA amended 46 USC 7703 to make conviction of the following offenses chargeable under suspension and revocation proceedings: driving under the influence of alcohol or drugs, traffic violations associated with a fatality, reckless driving, racing on the highways, and any offense that would prevent issuance of a merchant mariner's credentials. The Coast Guard is currently developing a comprehensive plan to implement this authority.

Access to National Driver Register: Section 4105 requires regulations that require that merchant mariner credential applicants make available information contained in the National Driver Register for determination of their responsibility. The Coast Guard is developing a regulatory planning document.

Prince William Sound Pilotage: Section 4116(a) gives discretion to the Secretary of Transportation to designate areas in Prince William Sound where certain vessels will not be subject to Federal pilotage requirements. An draft NPRM is in final clearance stages and should be published by the end of October, 1992.

Escorts for Certain Tankers: Section 4116(c) requires designating certain waters (Prince William Sound, Rosario Strait and Puget Sound, WA) where a minimum of two vessels must escort single hulled tankers greater than 5000 GRT. The Coast Guard published an NPRM (57 FR 30058 of July 7, 1992) on this issue. The proposed rule will require single hulled tankers over 5000 GT in Puget Sound and Prince William Sound to have two escort vessels if they are carrying oil in bulk.

Auto-Pilot: Section 4114(a) requires designation of waters where vessels may operate with their auto-pilot engaged. An NPRM (57 FR 514 of January 6, 1992) would allow the operation of these devices in all US waters except traffic separation schemes, regulated navigation areas, shipping safety fairways, anchorage areas, or within one-half mile of shore. Also, the auto-pilots must meet International Maritime Organization standards. A supplemental notice was published on October 2, 1992, and allowed the use of certain advanced systems in some of the prohibited areas.

Unattended Engine Room: Section 4114(a) requires the definition of conditions and designates waters where tankers may operate with unattended engine rooms. The original NPRM proposed to allow certain tankers to operate with periodically unattended engine spaces. However, the Coast Guard published a second NPRM on October 2, 1992 that revises the original NPRM and does not allow tankers to operate in US waters with unattended machinery spaces.

Second Licensed Officer on the Bridge: Section 4116(b) requires the Coast Guard to designate areas where tankers over 16000 GT will be required to navigate with two licensed officers on the bridge. The Coast Guard published an NPRM on October 2, 1992 proposing that at least two licensed officers be on the bridge of all tankers over 1600 GT when in the internal waters of the U.S.

Vessel Response Plans: Section 4202(b)(4) requires the owner or operator of a vessel carrying oil or hazardous substance to prepare and submit a response plan for a worst case discharge of oil. The Coast Guard published an NPRM on July 19, 1992. The Coast Guard also issued a Navigation and Vessel Inspection Circular (NVIC 8-92) on September 15, 1992, with guidance on preparation of vessel response plans. The Coast Guard will be publishing an Interim Final Rule.

Facility Response Plans: Section 4202(b)(4) requires the owners or operators of marine transportation related onshore facilities to prepare and submit response plans for a worst case discharge of oil or hazardous substance. These regulations will apply to facilities that could reasonably cause substantial harm to the environment by discharging oil or hazardous substances into navigable waters of the U.S., adjoining shorelines, or the Exclusive Economic Zone. The Coast Guard issued NVIC 7-92 on September 15, 1992, with guidance on preparation of facility response plans. The Coast Guard will be publishing an Interim Final Rule.

SUMMARY OF OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION HAZARDOUS MATERIALS REGULATIONS TITLE 29 OF THE CODE OF FEDERAL REGULATIONS

29 CFR 1910.1000 Subpart Z — Permissible Exposure Limits

29 CFR 1910.101-116 Subpart H — Hazardous Materials

29 CFR Subpart 2 1926 Hazard Communication Standard (HCS).

- Hazard Communication Standard

OSHA's Hazard Communication Standard (HCS), 29 CFR 1910.1200, divides chemicals into two categories. About 600 to 800 chemicals are considered to be hazardous because they have been regulated by OSHA; have an ACGIH Threshold Limit Value; or have been found to be a potential carcinogen by National Toxicology Program or International Agency for Research on Cancer. In addition to covering these listed chemicals, the HCS includes criteria for hazard classification. Chemical manufacturers and importers must use these criteria to determine if any of their other products would be considered hazardous under the rule, chemical manufacturers and importers must prepare container labels and material safety data sheets (MSDS) to convey hazard information and precautionary measures to chemical users.

Employers who use chemicals covered by the standard must keep labels on the containers, make the MSDSs available in the workplace and train their workers with respect to the hazards of the chemical and the precautions they must take in order to work with the substance. Under the OSHA standard, employers are also required to compile a chemical inventory list of all HCS-covered hazardous substances which they use in their workplace.

EPCRA section 312 requires an annual inventory which reports on substances covered by the HCS's MSDS requirements. (Section 311 requires one time reporting of an MSDS or list of MSDS chemicals.)

29 CFR 1910.120 — Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard

- Hazardous Waste Operations and Emergency Response

The standard defines hazardous substances by reference to lists of hazardous materials and hazardous wastes in HMTA regulations (49 CFR section 1712.1010and 171.8), CERCLA section 101(14), and RCRA regulations (40 CFR section 261.3).

29 CFR 1910.119 — Process Safety Management Standard

- Process Safety Management of Highly Hazardous Chemicals; Explosives and Blasting Agents

The PSM Appendix A list has been drawn from a variety of relevant sources which include: The New Jersey "Toxic Catastrophe Prevention Act;" the State of Delaware "Extremely Hazardous Substances Risk Management Act; the World Bank Manual of Industrial Hazard Assessment Techniques;" the Environmental Protection Agency "Extremely Hazardous

Substance List;" the European Communities directive on major accident hazards of certain industrial activities (82/501/EEC, sometimes called the Seveso Directive); the United Kingdom "A Guide to the Control of Industrial Major Accident Hazards Regulations 1984;" the American Petroleum Institute RP 750, "Management of Process Hazards;" the National Fire Protection Association NFPA 49, "Hazardous Chemicals Data;" and the Organization Resources Counselors, Inc. "Recommendations for Process Hazards Management of Substances with Catastrophic Potential."

- OSH Act authority -- Permissible Exposure Limits, (Subpart Z, 29 CFR 1910.1000), Hazardous Materials (Subpart H, 29 CFR 1910.101-116)section 6(b) rulemaking

OSHA uses regulatory definitions found in 29 CFR 1910 -- e.g., flammability is 100 degrees fahrenheit as a breakpoint. OSHA also classifies hazardous substances based on information obtained from various sources such as research reports. Permissible exposure limits are determined by information on dose-response relationships, threshold limit values, and time-weighted averages. Once OSHA has concluded that a particular substance should be regulated (based on available information and evidence) OSHA will begin a rulemaking process. This process includes the development of a proposed regulation, public notification about the proposal, and request for comments. The process also provides for public hearings. Final standards are based on all of the evidence obtained during the rulemaking process.

In addition to national consensus standards, OSHA receives referrals of substances that pose an unreasonable health risk from EPA under TSCA section 9(e). Other sources for information about potential hazardous substances include research reports written by the National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH). The Agency also maintains a database of hazardous substance sampling results collected in the course of health inspections. These are the basis for any citations of OSHA health standards (subparts H and Z) for over-exposure.

SUMMARY OF FEDERAL EMERGENCY MANAGEMENT REGULATIONS FOR RADIOLOGICAL SAFETY: TITLE 44 OF THE CODE OF FEDERAL REGULATIONS

44 CFR

Part 350 — Planning and preparedness in areas surrounding nuclear power plants

Part 351 — Defines multi-agency participation and responsibilities in the Federal Radiological Preparedness Coordination Committee

Part 352 — Commercial nuclear power plants' emergency preparedness planning.

Part 353 — Fees for services in support, review, and approval of state and local government or licensee radiological emergency plans and preparedness.

DEPARTMENT OF DEFENSE DIRECTIVES

- DOD Directive 4120.14, Environmental Prevention, Control, and Abatement, which implements Executive Order 12088 and OMB Circular A-106 pertaining to control of wastewater discharges, air emissions, and solid waste disposal from DOD facilities.
- DOD Directive 4210.5, Hazardous Material Pollution Prevention, which prescribes policy, responsibilities, and procedures for hazardous material pollution prevention.
- DOD Directive 5030.41, Oil and Hazardous Substances Pollution Prevention and Contingency Planning, which sets forth policy in support of the National Oil and Hazardous Substances Pollution Contingency Plan.

Each military service also has issued specific regulations, instructions, or orders which require each installation to establish hazardous materials safety planning, prevention, preparedness, and response programs. Examples include Army Regulation 200-1, Environmental Protection and Enhancement, and Marine Corps Order P5090.2, Environmental Compliance and Protection.

Under Army Regulation 50-6, Chemical Surety, the Army conducts exercises to test the CSEPP.

CHAPTER 4. PROBLEMS WITH HAZARD IDENTIFICATION, DEFINITION AND CLASSIFICATION

INTRODUCTION

As indicated by the Report of the National Response Team Task Force on Federal Control of Hazardous Materials (NRT Task Force Report), the most significant cause of gaps and inconsistencies in federal control of hazardous materials are within the statutory framework under which federal agencies function. The myriad of statutes that affect control of hazardous materials was developed over a long period of time under widely varying circumstances. As such, the independent development of U.S. laws has tended to result in gaps, inconsistencies and overlaps in authority, inhibiting the development of any overall strategy for controlling hazardous materials.

This Chapter explores various types of problems inherent in the existing statutory and regulatory framework. It discusses the regulatory approaches taken by federal agencies to identify, define and classify hazards. The recent National Response Team Task Force Report provides many of the findings and examples described in this Chapter because of their relevance to the charge of this study. Among the problem areas affecting regulatory responsibility, management and control of hazardous materials discussed in this chapter are:

- Terminology problems;
- Agency constraints;
- Problems with multiple hazard classification systems and chemical lists; and
- Gaps in the hazardous materials safety system.

TERMINOLOGY PROBLEMS

Although legitimate purposes exist for the use of different terms for regulated substances in a variety of statutes, terminology problems surface in a number of different areas with respect to hazardous materials safety. At least nine different laws contain specific definitions for hazardous materials and for regulated communities or responsible parties. Eight different laws contain different chemical lists or require or support some hazard classification system. Most of these laws and their implementing regulations also contain different definitions for reportable events. In addition, problems regarding chemical nomenclature and the effect of different uses on definitional requirements add to the complexity of the problem. The composite picture of statutory and regulatory definitions, and the plethora of different chemical lists form a complicated legal maze for both the regulated community and the regulators. The following is a discussion of terminology problems.

Statutory Definitions for Hazardous Materials. As indicated by the NRT Task Force Report, one area that both the federal regulators and the regulated community have cited as a source of considerable confusion is the wide range of definitions and criteria used to define regulated substances. The different statutes containing terms and definitions for regulated substances are shown in Figure 4-1. The Occupational Safety and Health Act does not explicitly include a definition for the term "hazardous material." Each law was drafted independently of the other laws and, in many instances, addresses different purposes. Therefore the terms defined for the individual statute may, or may not, address a different universe of materials or a different segment of the regulated community. Neither the regulated community nor the public is necessarily conversant with these distinctions; thus, the more numerous the distinctions, the greater the potential confusion.

An example illustrating this point is the multiple, though different uses of the term "hazardous substance." The Federal Water Pollution Control Act (Clean Water Act or CWA) as amended, uses the term "hazardous substances" to define approximately 300 materials under the oil and hazardous substance liability program. However, CERCLA section 101 also uses the term "hazardous substance" to refer to all materials regulated under several statutes, including the CWA, as well as other federal environmental

Figure 4-1
Statutory Terms for the Regulated Materials and the Regulated Community

ACT	MEDIA AFFECTED	REGULATED MATERIALS	REGULATED PARTIES OR ENTITIES	EMERGENCY EVENTS
Clean Air Act (CAA)	Ambient air	• Air pollutant • Regulated substance, other extremely hazardous substance (§112(r))	• Owner or operator (o/o) of stationary source • Mobile sources	• Emission • Accidental release (§112(r)(2)) • Imminent and substantial endangerment (§§112(r)(9), 303)
Clean Water Act (CWA)	Waters of the United States	• Pollutants (§502(6)) • Oil and hazardous substances (§311; 40 CFR part 116) • Toxic pollutant (307)	• Point source (§502(14)) • Vessel, onshore facility, offshore facility (§311) • Direct and indirect point sources	• Discharge (section 502(12)) • §311(b) report to NRC concerning hazardous substance and oil spills • Imminent and substantial endangerment (whenever a presented by a pollution source, § 504).
Resource Conservation and Recovery Act (RCRA)	All media	• Solid waste, hazardous waste (statutory definition -- §1004(27), §1004(5)) • Solid waste (definition for purposes of hazardous waste regulations -- principally 40 CFR §§261.2-.4) • Hazardous waste (regulatory definition -- 40 CFR part 261)	• Person (§1004(15)) • Generator (§3002; 40 CFR §260.10) • Transporter (§3002; 40 CFR §260.10) • o/o of treatment, storage, or disposal facility (§3004; 40 CFR §260.10) • Solid waste management facility (§1004(20); 40 CFR part 258) open dump (§1004(14) sanitary landfill (§1004(26))	• Handling, transportation, treatment, storage or disposal • Imminent and substantial endangerment (§7003)
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	All media	• Hazardous substance (§101(14), 40 CFR §300.5,§302.4) • Pollutant or contaminant (§101(33), 40 CFR §300.5)	• Transporter • Arranger • Owner or operator • Person	• Release of a hazardous substance above a reportable quantity (§103) • Release or threat of a release of a hazardous substance (§104(a)) • Release or threat of a release of a pollutant or a contaminant that may pose an imminent and substantial danger (§104(a)) • Imminent and substantial endangerment because of a release or threatened release (§106)

ACT	MEDIA AFFECTED	REGULATED MATERIALS	REGULATED PARTIES OR ENTITIES	EMERGENCY EVENTS
Toxic Substances Control Act (TSCA)	All media	• PCBs (§6(e); 40 CFR §761.3) • Asbestos (§202; 40 CFR §763.83) • Chemical substance (§3; 40 CFR §710.2)	• Person • Local education agency (Title II)	• Chemical substance presents or will present unreasonable risk (§6) • Imminently hazardous chemical substance (§7(f)) • Notice of substantial risk from a chemical substance (§8)(e)) • Damaged or potentially damaged asbestos-containing material (Title II)
Safe Drinking Water Act (SDWA)	Drinking water sources	• Contaminant	• Public water system (section 1401(4)) • Underground injection (section 1421(d)(1)	• Contaminant presents an imminent and substantial endangerment (section 1431(a)
Emergency Planning and Community Right-to-Know Act (EPCRA)	All media	• Extremely hazardous substance (§302; 40 CFR part 355 App. A and B) • Hazardous chemical (§311; 40 CFR part 370) • Toxic chemical (§313; 40 CFR part 372)	• o/o of facility • o/o of establishment	• Release of EHSs above a reportable quantity • Release of CERCLA hazardous substances
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	All media	• Pesticide (§2; 40 CFR part 152)	• Registrant or applicant for registration • Producer (§7) • Person (§12)	• Pesticide generally causes unreasonable effects (§6(h)) • Imminent hazard (§6(c))
Hazardous Materials Transportation Act (HMTA)	All transport modes except pipelines	• Hazardous materials substance/material including hazardous substances capable of posing unreasonable risk to health, safety, property when transported in commerce (49 CFR)	• Shippers and carriers of hazardous materials in commerce, or reconditioner testers of containers, drums, and packages for use in transport of hazardous materials	• a hazardous materials release causing death, hospitalization, closure of a major artery or evacuation for more than one hour, property damage exceeding $50,000,flight pattern alteration, or involves radioactive material, etiologic agents, or continued danger to life.
Occupational Safety and Health Act (OSHA)	All media	• Hazardous chemicals	• Employers	• Significant releases

Figure 4-2

NUMBER OF CHEMICALS OVERLAPPING IN EACH LIST[1]

CHEMICAL LIST	CERCLA (737 listed chemicals) *	SARA section 302 (360 listed chemicals)	CAA 112(r) flammables (62 listed chemicals)	OSHA (125 listed chemicals) **
CERCLA (737 listed chemicals) *	—	138	11	47
SARA section 302 (360 listed chemicals)	138	--	0	60
CAA 112(r) flammables (62 listed chemicals)	11	0	--	11
OSHA (125 listed chemicals) **	47	60	11	--

* Specific chemicals with CAS numbers only; does not include chemical categories, RCRA waste streams, or unlisted hazardous wastes.

** Specific chemicals with CAS numbers only.

[1] The number of chemicals on the OSHA list of highly hazardous substances reflects on those chemicals listed with a unique CAS number. Chemicals listed under different names, but with the same CAS number are counted once. Mixtures and categories of chemicals without CAS numbers are not counted. OSHA also covers flammables as a class; because they are not listed separately and, therefore, cannot be compared with other lists, they are not included in the 125 chemicals.

statutes. Therefore, materials that are hazardous substances for the purposes of the CWA are included in the CERCLA definition of hazardous substance, but the converse is not true.

Statutory/Regulatory Definitions for Reportable Events. A problem occurs from the definitions assigned by different laws or regulations for emergency events, (e.g., release, discharge, spill, incident imminent and substantial endangerment) and from the lack of definitions for certain purposes. Typically terms serve several functions: they guide the regulatory definitions for accident reporting; they establish what responsible parties may be liable for; and, they establish the authority of government agencies to step into a situation if it poses a threat. Because the terms are different among the various statutes, these differences have created possible confusion, inefficiency and inadequate information regarding accident reporting. Also because of differences in or lack of definitions of what is considered an emergency, accident data is obfuscated by the reporting of events which are longer term and not immediately hazardous.

Chemical Nomenclature. Although not necessarily caused by statutory or regulatory action, another terminology problem has significant implications for prevention and response programs. The same substance may be identified by different names or other identifiers, creating the appearance of two unique substances. While there may not be confusion regarding the regulations that apply to a given material, identifying whether the substance under consideration is the hazardous material may be difficult if it is called different things. This problem is particularly acute in emergency situations. There does not appear to be any universally accepted naming convention for materials in commerce. This can result in a number of competing names for a substance. There are a number of scientific naming conventions used by the academic community, however, many of these names would not be recognizable to the lay users of the substance and are seldom used for regulatory purposes. Often, trade names and product names become synonymous or commonly used to identify substances. For example, OSHA requires that the common name and the chemical name be included on Material Safety Data Sheets, which are widely circulated with the substance. This information is then used for other purposes as the substance moves through the stream of commerce, acquiring a life of its own.

There are several proprietary chemical identification systems (the predominant one in the U.S. being the Chemical Abstract Service (CAS)), that identify chemicals with a preferred name and an identification number. However, because CAS is a proprietary system and the right to use this naming and numbering convention has restrictions and can require the payment of substantial royalties, this information is not consistently used and verified in the regulatory process. The system also does not address mixtures, solutions, end-user products, and generic classes and therefore, even when used, may result in gaps. In transportation, the identification of hazardous materials is addressed by the use of four-digit U.N. identification numbers (United Nations designated) and standardized worldwide; however, there is not cross-referencing available to other identification systems. Additionally, these numbers are not unique to each chemical and one U.N. number may identify several substances, while one substance may have several U.N. designations because of its physical state or other properties it may have during its movements. Each statute or regulatory authority often selects one or more of these naming conventions to identify their chemicals of concern. Without a higher chemistry degree, it is often difficult or impossible to determine whether the chemical being regulated by one program is the same as a chemical being regulated by another. To illustrate the problem, there are over 5000 synonyms for the 360 extremely hazardous substances named under the Emergency Planning and Community Right-to-Know Act. Various agencies' regulations or statutes may address these same 360 substances, but may use a synonym rather than the same name used in EPCRA.

This identification issue causes problems for the regulated community in knowing which regulations apply and how. It causes problems for the regulators and scientific community in coordinating their efforts and in identifying gaps and overlaps, and for the emergency responder who cannot be sure the substance being identified is the chemical of concern. In addition, this issue can result in regulatory gaps: if a chemical is identified by its CAS number for example, it may not be the primary chemical of concern or it may only be one of several almost identical chemicals, of which only the one comes within the purview of the regulation. If a name is used to identify the chemical, there may be considerable confusion as to which of many very similar chemicals or chemical groups the rule refers.

Definitional Requirements. Statutory definitions cause confusion when different regulations are triggered for the same substance, depending on how it is defined. In particular, regulations that apply to a material may change when the definitional "status" of a material changes, even though the material itself has not changed in composition. The various uses of the term "hazardous waste" are an example of this problem. Such materials, regulated by EPA under RCRA, are also subject to CERCLA reporting requirements. Hazardous materials that are transported or otherwise treated as commercial product generally are not subject to RCRA regulations because they are not considered wastes. However, if such commercial materials are released and are no longer considered usable, they may become a hazardous waste and, thus, subject to reporting requirements. In some cases, materials do not even have to be released to undergo this change in status; for example military explosives, which are reactive and, thus, hazardous, become wastes when an authorized DOD or DOD component representative determines that it will be discarded (destroyed) rather than retained as an item of military ordinance.

AGENCY CONSTRAINTS

A number of constraints exist which create barriers to the effective implementation of a comprehensive hazardous materials safety system. These include: 1) Overlaps or contradictions which exist between agencies' programs; 2) Differing agency missions; 3) Constraints of agency resources; 4) Difficulties in effective coordination.

Contradictions and Overlaps. Problems arise when different statutes apply to the same universe of materials and result in overlaps in regulatory requirements, or create contradictions when targeting different segments of the regulated community. Two examples illustrate each of these situations.

When Congress passed the Emergency Planning and Community Right-to- Know Act, they linked the CERCLA and Extremely Hazardous Substance (EHS) lists for purposes of reporting releases to state and local governments, although the lists were not linked for federal reporting purposes. Chemicals on both lists must be reported to state and local authorities in the event of a release of a reportable quantity (RQ); only chemicals on the CERCLA list are required to be reported to the federal government. With the Superfund Amendments and Reauthorization Act, Congress also linked the CERCLA hazardous substances list to the DOT regulated hazardous materials by requiring DOT to list and regulate CERCLA substances under HMTA. Under the DOT regulations, all CERCLA substances, if not already covered by DOT criteria, must be considered hazardous materials and labeled appropriately. Furthermore, the shipping papers must indicate, usually by the notation "RQ", that the material is subject to CERCLA, if released. However, there is no such requirement for identifying EHS substances, and thus, no warning or reminder that the release of those substances must also be reported to state and local authorities. While DOT's regulations including incident reporting generally apply to most of these EHSs because they meet the specific criteria of hazardous materials, there is no cross-referencing, as there is under CERCLA, to assist shippers in complying with these federally mandated notice requirements.

The dividing line between one law and an agency's authority and another law and agency's authority in some instances must be discussed and agreed upon by the responsible agencies. Also statutes addressing the same universe of materials create contradictions at times when they target different segments of the regulated community. For example, the Occupational Safety and Health Act, the Federal Insecticide, Fungicide, and Rodenticide Act, and HMTA each provide worker protection for different users and handlers of pesticides. DOT is responsible for establishing worker protection standards in transportation, including storage incident to transportation. Pesticides often qualify as hazardous materials. OSHA is responsible for assuring safe and healthful working conditions for most fixed-site workers involved in chemical activities. EPA regulates the use of pesticides and, as part of those regulations, provides workers protection for exposure to those chemicals. EPA, DOT, and OSHA continue to discuss their overlapping jurisdictions and the appropriate resolution of enforcement authority. However, the regulated community must determine how to comply with these various regulatory programs and can face enforcement actions for non-compliance.

Agency Missions. Based on findings from the NRT Task Force Report, control of hazardous materials is also affected by how agencies choose or are required to implement the authorizing statutes.

Agencies are constantly balancing a range of interests in developing and implementing their control programs for hazardous materials. Gaps and inconsistencies are inevitably going to arise because each agency emphasizes different issues and balances interests in different ways, consistent with its mission. One factor that affects how an agency chooses to implement its program is the burden that its regulations place on the regulated community. For example, if a department's mission, such as DOT, is to ensure safety in carrying out certain significant activities affecting the flow of commerce, the agency will have to balance the need for regulatory control with the objective of not unduly burdening that flow. Or, if for example, an agency's mission such as EPA, is to understand what and how environmental damage is caused and to protect citizens and the environment from harm, then the agency will have to weigh its proposals for specific criteria in its environmental standards against the availability of current scientific documentation.

Agency Resources. Another factor which results in gaps and inconsistencies is the availability of resources for implementing programs. Although an agency may have a broad charter for controlling hazardous materials, it may not have resources sufficient to expand its regulatory program in ways that it believes are environmentally beneficial. For example, EPA's primary mission in controlling hazardous materials is to protect human health and the environment by regulating the production and use of such materials, by preventing their release, and by ensuring that the effects of any release are mitigated. DOT's primary goal is to ensure the safe transport of hazardous materials. Under HMTA, DOT has the authority to address a broad range of hazardous materials that "pose an unreasonable risk to health and safety or property," but resource constraints limit it from regulating all of them. In its regulations, DOT identifies hazards associated with short-term, one-time exposures from accidental releases in transportation. Chronic exposures are not anticipated because spills are quickly cleaned up. However, one-time release incidents may result in some long-term hazards, which are not generally covered by the HMR. Thus, because these risks are not easily identified nor available from other known sources, DOT does not provide regulatory criteria to address such risks.

Cross-agency Impacts. These are another source of concern, overlap, and contradiction. There are two ways cross-agency impacts become problematical: (1) when unintended impacts from one agency's regulatory actions adversely affect the programs of another agency; and, (2) when agency coordination activities would share a common purpose, but resource limitations, budgetary procedures, and external constraints serve to discourage such coordination.

When one agency develops regulations which create inconsistencies or overlap with another agency's existing requirements, problems inevitably arise. For example, to prevent spills during transportation of hazardous materials that involve pesticides, DOT promulgated strict regulations for both transportation and storage incidental to transportation. These regulations cover specification and performance standards for packaging, and hazard communication through marking and labeling. However, as required by FIFRA section 19(d), EPA is proposing regulations on container design and labeling of pesticide packaging to minimize waste and protect human health and the environment. Thus, both agencies are prescribing standards for the packing of pesticides that are hazardous materials. To avoid confusion and unreasonable burden on the regulated community, it will be essential that the two agencies work in close cooperation.

Cross-agency impacts also occur when one agency issues regulations that require additional implementing actions by another agency. A similar problem also occurs when one agency may not have the resources to follow through with regulations, or both agencies may not address all of the same components. An example illustrating these types of impacts is the Clean Air Act. This Act required states to adopt and submit to EPA plans setting forth their control strategy for attaining national ambient air quality standards. As part of their effort to comply with ozone requirements, several states subsequently established provisions that required the use of marine vapor control systems to collect vapors during the loading of volatile organic compounds, such as oil and gasoline, into the tanks of tank ships at marine terminals. These requirement have significant impact on the U.S. Coast Guard, which regulates tank vessel loading operations for safety purposes. Because the use of vapor collection systems for flammable cargoes poses significant safety concerns, the Coast Guard had to conduct technical analyses and develop regulations. Implementation and enforcement of the regulations, which took more than three years and required extensive resources to develop, are still ongoing. As new issues are studied and additional hazardous materials are brought within

the scope of the requirements for air pollution control, considerable Coast Guard effort and coordination with EPA will be needed.

Cross-agency Coordination. Some laws require specific coordination between agencies. In some cases, agency coordination cannot resolve the inconsistencies and overlaps in the language of separate statutes. In some cases, irrespective of statutory mandate, agencies and departments have conferred with one another and agreed through Memoranda of Understanding on ways for implementing various provisions, or on procedures for determining how they are going to work together. However, some regulations, like statutes, have been developed and adopted independently by the different agencies, without full benefit of the context or impacts which the regulations may have on the total regulatory system for hazardous materials safety.

Coordination of agencies resources for a shared common goal is another area of difficulty. Too often programs or problems which concern more than one agency are not coordinated, because the coordinating mechanisms do not exist, the agency primary mission inhibits allocation of resources to a shared goal, legal constraints in agency authorities, or budgetary procedures do not provide sufficient incentives to pursue new policies or, in fact, may discourage such collective policy-making. An example which illustrates a positive use of resources for a common goal is the National Response Center, funded by the U.S. Coast Guard, EPA and DOT/RSPA and staffed by the Coast Guard. A number of agencies or departments who have a stake in emergency response to hazardous materials accidents benefit from development and operation of the National Response Center as the central point for notification to the federal government of hazardous materials accidents. However, when changes or additions have been needed to improve National Response Center operations, obtaining additional resources, including personnel, has been problematical. Other examples of potentially shared goals which have not been adequately addressed include: identifying and developing common features to each of the different accident databases, and research and development for safety matters. In some instances, intra-agency efforts have been mounted just to establish common area among different program or statutory areas, however, extension of this concept to cross-agency impact areas is sometimes thwarted for the reasons mentioned above, resulting in multiple burdens on the regulated community.

CHEMICAL LISTS & HAZARD CLASSIFICATION SYSTEMS

Chlorine, one of the most widely used chemicals in the U.S., is classified by the federal government as a hazardous substance (EPA CWA, CERCLA), extremely hazardous substance (EPA EPCRA), hazardous chemical (OSHA), hazardous material (DOT), highly hazardous chemical (OSHA), hazardous air pollutant (EPA CAA), and toxic chemical (EPA EPCRA).

In August 1985, a chemical manufacturer in Institute, W. VA., released aldicarb oxime into the air; more than 100 local residents were treated at hospitals for exposure to the substance. Aldicarb oxime is not included on any federal list of substances.

The two items above illustrate problems with the current approach to regulating chemicals: the federal government has a number of lists that overlap, and, despite the number of such lists, some chemicals that may be hazardous in the event of a release are not included on any list. The plethora of lists creates confusion and a burden on the regulated community. The inability of chemical lists to identify all possible hazardous substances hinders some government agency's ability to respond and regulate.

Hazard Classification Systems used by Different Regulatory Agencies. Different regulatory agencies have taken different approaches to hazard classification. These differences in approach result from agency mission, history, statutory mandates, and the lack of clear definitions of what should be controlled and why.

EPA Chemical Lists. While some EPA programs, such as RCRA, use criteria or a combination of criteria and lists to identify hazardous materials, often EPA classifies hazards by placing chemicals on lists designed to address a variety of regulatory purposes. Many of these lists include chemicals specifically named by statute, and add chemicals through the regulatory process often based on statutory criteria. EPA

lists often address specific different types of hazards based on identifiable criteria, i.e. aquatic toxicity, or acute (mammalian) toxicity, reactivity and ignitability. Criteria for being placed on these lists vary across the agency and often each office adopts different labels for their criteria. This may be a result of the differing terminology in legislative authority for creating the list in the first place. For example, EPA classifies substances which harm living organisms through chemical action as mammalian toxins, acute toxins, aquatic toxins, chronic toxins, neurotoxins, mutagens, teratogens, and carcinogens. They classify some substances based upon their physical dangers as reactive and ignitable. Each of these classifications has some type of criteria (which may be quantitative or qualitative) and this criteria represents the cut-off for inclusion in this grouping. Although more than one office may use the same terminology, the cut-offs will often be different. Thus a mammalian toxin for one program may not be covered at all by another seeking to preclude similar harm. This confusion is then repeated by the various lists and groupings developed by other agencies seeking to control against similar threats. Some lists are compilations of other lists, such as the CERCLA list. Different offices within EPA are responsible for initially developing the various chemical lists and the Office of Policy and Program Evaluation is responsible for establishing priorities or avoiding duplications or overlap.

DOT Criteria Based System with Specific Listed Chemicals. DOT's primary emphasis has been in regulating materials that pose medium and high acute hazards to the public and environment that may be released during transportation. Fewer than 3,000 hazardous materials are specifically listed under DOT's regulations; the rest are regulated under generic descriptions in 20+ hazard classes, each of which has specific defining criteria. The regulatory system is based on classifications according to the criteria and a hierarchy between these criteria. DOT's system has also been recently revised to put the system in harmony with international regulations and continue to support American competitiveness in the international market. In essence, the DOT system of hazard classes requires industry to determine if the hazardous materials it ships fall into any one of the hazard classes. If the shipper determines the material being shipped is a hazardous material according to DOT regulations, then the shipper must comply with the regulations.

These hazard categories are relatively standardized throughout the world within transportation. However, even in transportation this standardization is not complete. There are exceptions to the classification schemes for some substances when shipped domestically. For example, ammonia is a poison gas when shipped internationally but may be classified as a nonflammable gas when shipped domestically. Distinctions between flammables and combustibles may be retained when shipping domestically whereas in international commerce the combustible designation has been abandoned. These classification exceptions may create new problems for responders when trying to identify certain hazardous materials at accidents.

Additionally, these classifications do not necessarily apply beyond transportation. Examples of the DOT classification scheme include poisons, explosives, corrosive, oxidizers, flammables, organic peroxides. With the exception of the poison material, the CERCLA listed substances and a recently proposed adoption of an international list of aquatic toxins, DOT's classifications are primarily concerned with substances which present physical hazards such as fire, explosion, or chemical burns, since these are the hazards which the transportation regulations are first intended to address. They do not generally concern hazards associated with pollution threats - carcinogens, mutagens, reproductive toxins - because the nature of the regulatory scheme is to clean up such hazards if they occur occasionally in transportation. However, the criteria which is used by DOT for such classification is often different from the criteria used by EPA or other agencies such as OSHA when classifying similar or even identical hazards.

OSHA's Classification System. OSHA's primary classification requirements appear in the Hazard Communication Standard (HCS). The HCS includes criteria for 23 different physical and health hazards. Chemical manufacturers and importers are required to evaluate the products they produce or import using the criteria in the rule, and available scientific data. Product labels and material safety data sheets must then be prepared to convey the hazard information to the users. Like the other agency approaches, this classification system applies only to OSHA requirements and is not necessarily consistent in substance or terminology with schemes developed by other agencies.

Current Lists

Most existing lists are statutorily mandated as shown in Figure 4-3. Many lists were developed to address specific concerns and carry with them substantial regulatory requirements. Below is a partial summary.

The *Clean Water Act (CWA) section 307* mandated adoption of an existing list of "toxic pollutants," and suggested periodic revisions. The existing list came from a consent decree and was based on toxicity and prevalence. The consent decree listed 65 pollutants and classes of pollutants, but, for operational purposes, EPA uses a list of 126 specific chemicals ("priority pollutants") contained within the list of 65 pollutants and classes of pollutants. The purpose of the list is to set priorities for water pollution control efforts. While discharges of all "pollutants," broadly defined, are controlled by permits and monitoring requirements, toxics have more stringent requirements in several areas. Permitted facilities are required to monitor their discharges and report on their compliance or noncompliance with permit limits.

Release of these substances requires the facility to notify the federal government. The releasing facility is liable for the costs of cleanup and damages.

The *Clean Air Act section 112(b)* list of hazardous air pollutants was included in the 1990 amendments to the Act. The purpose of the list is to identify those toxic substances routinely released to air whose emissions need to be controlled. The list focuses on substances that create adverse effects to human health or the environment from long-term exposure; accidental releases are specifically excluded from consideration. Facilities releasing more than specified amounts will be required to obtain a permit that sets limits on the amounts that may be released. Facilities will be required to install control technologies and monitoring equipment.

The *RCRA* "list" of hazardous wastes is comprised of criteria ("characteristic") wastes as well as "listed" wastes, which are materials generated from specified processes and identified chemicals. The focus of the list is wastes whose disposal needs to be controlled to ensure that they are not released to the environment. Covered wastes include the full range of potential toxic effects, including acute toxicity. Facilities treating, storing, and disposing of such wastes must obtain a RCRA permit and install control technologies to prevent releases. The RCRA list, by law, is also incorporated within the CERCLA list, raising questions about whether certain materials controlled as wastes also need to be regulated for purposes of reporting for emergency releases.

The *EPCRA section 313 list* was mandated by statute and was a compilation of two state lists. Facilities that meet reporting criteria must file annual reports on their annual releases of listed toxic chemicals to all environmental media and must submit additional information under the Pollution Prevention Act, beginning with 1991 reports. The original list was not based on any toxicity criteria; substances may be added if they cause either short-term or long-term adverse health effects, or environmental effects. Accidental releases must be added to routine releases to determine annual emissions.

OSHA regulates "hazardous chemicals" to ensure that employees working with substances which have the potential to cause adverse health effects or to pose physical hazards are protected from those effects. The Hazard Communication Standard includes 23 hazard definitions to assist manufacturers in determining whether a substance is hazardous for the purpose of communicating information to employees. Chemicals considered hazardous under the Hazard Communication Standard are also subject to annual reporting under EPCRA sections 311 and 312 to state and local governments.

The substances regulated by OSHA under the authority of the OSH Act include a list of hazardous air contaminants and their permissible exposure limits (PELs). Also contained in the CFR are requirements for additional materials, including compressed gases, hydrogen, and flammable and

Figure 4-3: Summary of Chemical Lists by Statute

List	Endpoint of Concern	Regulatory Purpose*	Regulatory Requirements	Basis for Listing
CERCLA hazardous substances	Toxicity Reactivity Ignitability Radioactivity	Notification of the federal government to allow determination of whether federal action is required in response to a release. Federal government empowered to undertake response.	Notification of releases above an RQ. CERCLA liability for threatened or actual releases.	Statutorily mandated by inclusion of substances on other EPA lists; regulatory discretion under CERCLA, section 102.
CERCLA pollutants and contaminants	All environmental risks	Response.	No notification required.	No specific listing.
CWA § 311	Aquatic toxicity	Notification of federal government of releases to navigable waters.	Notification of releases; liability for cleanup and damages.	Statutorily mandated criteria (specifics undefined).
CWA § 307	Ecotoxicity and Human Health	To develop effluent standards to limit water pollution.	Obtain and comply with permit or national standards for releases.	Statutorily mandated adoption of existing list, additions based on ecotoxicity.
CAA NESHAP	Chronic toxicity	To develop emission standards to limit releases to air.	Obtain a permit and install equipment to limit emissions.	Statutorily mandated list.
RCRA	Reactivity Toxicity Ignitability Corrosiveness **	Control life cycle of hazardous waste from generation to treatment, storage and disposal.	Obtain a RCRA permit and install measures to treat, store and dispose of wastes and prevent the releases.	Criteria related to endpoints
EPCRA § 302 (EHSs)	Acute toxicity	Emergency planning for accidental releases.	Notify State and local entities of presence of EHSs in amount exceeding TPQs.	Statutorily mandated adoption of existing list, based on acute toxicity.
EPCRA § 304	Acute toxicity Reactivity Ignitability	Notification of state and local governments of releases.	Notification of state and local governments of releases.	Combination of EPCRA § 302 and CERCLA list.
EPCRA § 313	Initially Undefined Revisions based on health & environment	Annual reporting on releases to all environmental media.	Prepare a TRI Report if manufacturing, processing, or using chemicals in amounts above threshold.	Statutorily mandated list, based on two state lists; revisions based on human health and environmental impacts.
CAA 112(r) Regulated Substances	Risk to human health & the environment	To identify chemicals that cause acute adverse effects on public health or the environment and prevent accidental releases of the substances.	Develop and implement an accidental release prevention program for facility if using and storing chemicals in amounts above threshold.	Statutorily mandated criteria of "risk."

List	Endpoint of Concern	Regulatory Purpose*	Regulatory Requirements	Basis for Listing
OSHA Highly Hazardous Chemicals	Toxicity Reactivity Flammability Explosivity	To identify chemicals that could result in serious injuries or fatalities to workers in the event of an accidental release.	Develop and implement an accidental release prevention program for facility if using and storing chemicals in amounts above threshold.	Statutorily mandated.

* These lists may serve purposes other than those that are the focus of this report and summarized in this table. For example, listing a substance under CERCLA affects liability and the scope of the response.

** Otherwise hazardous to human health or the environment.

combustible liquids. Additionally standards have been promulgated for 26 hazardous substances pursuant to the authority granted OSHA under section 6(b) of the OSH Act.

OSHA also incorporates lists of hazardous materials, wastes, and substances from DOT and EPA in its Hazardous Waste Operations and Emergency Response standard. The standard defines hazardous substances by reference to lists of hazardous materials and hazardous wastes in other statutes.

The following lists are directly related to accidental release planning and notification.

The *CWA section 311* list of hazardous substances was developed based on statutorily mandated criteria related to aquatic toxicity. These substances are generally not released to water on a routine basis; the substances are those that, when released in any quantity, pose an imminent and substantial endangerment to the public health or welfare, including impacts on fish and wildlife.

The *CERCLA list of hazardous substances* is a statutorily mandated compilation of CWA, TSCA, CAA, and RCRA lists, as well as any substance designated pursuant to CERCLA section 102. Persons in charge of facilities that release more than a reportable quantity of any hazardous substance within a 24 hour period are required to notify the federal government of the release to enable the government to determine if a federal response action is required. Owners and operators of these facilities or transporters may be subject to CERCLA liability for releases or threatened releases of listed substances.

The *DOT hazardous materials* are defined by both a list and criteria. The purpose of the list and criteria is to define those substances that if released during transportation would pose a hazard to the public. The criteria include flammability, combustibility, explosivity, corrosivity, oxidation, toxic by inhalation, radioactivity, etc. The regulations for covered substances include rules for shipping containers, marking of containers, placarding vehicles, storage, and handling. Releases that result in a death, hospitalization, evacuation of more than one hour, closing of a major transportation artery for more than one hour, or at least $50,000 in property damage must be reported to DOT immediately. Carriers are required to file written notification of all accidental releases.

The *OSHA list of highly hazardous chemicals,* required by the Clean Air Act Amendments, includes reactive and explosive substances. The list identifies more than 130 specific toxic and reactive chemicals covered in specified quantities and includes flammable liquids and gases in quantities of 10,000 pounds or more. This list pertains to the Process Safety Management of Highly Hazardous Chemicals; Explosives and Blasting Agents (PSM) rule, promulgated by OSHA to prevent accidental releases of chemicals which could pose a threat to employees.

The *EPCRA section 302 list of extremely hazardous substances (EHSs)* was mandated by reference in the statute to a preexisting EPA list. The list, developed by EPA prior to the passage of EPCRA, at present is based solely on acute mammalian toxicity (and other criteria for modifying the list). Facilities with more than a threshold planning quantity of an EHS are required to notify the state and participate in community planning for a chemical emergency.

CAA section 112(r) mandates EPA to develop a list of at least 100 substances that cause or may cause serious adverse effects to human health or the environment in the event of an accidental release to air. Facilities with more than a threshold quantity will be required to comply with accidental release prevention regulations that EPA must promulgate. These regulations will include the requirement for an offsite consequence analysis, a prevention program, and an emergency response program, which will be submitted in a risk management plan to the Chemical Safety and Hazard Investigation Board, the state, and local authorities. Facilities will register with EPA. The purpose of the regulations is to prevent accidental releases and lessen the severity of those releases

that do occur to protect the public and the environment. Like the hazardous air pollutant under 112(b), there is a petition process for adding and deleting chemicals from this list.

TSCA 8(e) requires manufacturers, processors, and distributors of chemicals to notify EPA when a release of a chemical causes significant damage to human health or the environment in an emergency, as well as after the incident. TSCA does not list substances but, instead, defines covered substances by their characteristics. Pesticides and certain other categories of substances (e.g. pharmaceutical) are not covered. EPA is currently reviewing section 8 (e).

Who Is Covered By Existing Lists

Because the lists generally include the major commodity chemicals, the regulations affect facilities across most Standard Industrial Classification codes, not just the chemical manufacturers. Virtually every manufacturing industry is potentially covered, as are the utilities and public treatment systems. A significant number of wholesalers and some service industries are also affected. For example, rules that cover chlorine affect chemical manufacturers, food processors, the pulp and paper industry, water and waste treatment systems, utilities, wholesalers, and some non-residential swimming pools. Rules that cover ammonia potentially affect chemical and fertilizer manufacturers, food processors and distributors, farm chemical distributors, and, in some cases, farmers. The major acids are widely used in the metal and electronics industries, as are many solvents.

The number of facilities any list applies to depends on the thresholds that apply as well as any other limitations in the law. The OSHA hazardous chemicals encompass the largest universe because the standard covers as many as 600,000 chemicals and is subject to no thresholds; the number of affected facilities may be as high as three or four million. A subset of this universe, estimated in excess of one million facilities, is also subject to MSDS and annual reporting under EPCRA sections 311 and 312. Most other lists affect far smaller universes. The EPCRA section 313 requirements currently affect approximately 30,000 manufacturers. The OSHA and EPA accident prevention lists are likely to affect approximately 150,000 facilities, the majority of which are outside the manufacturing sector.

Problems with Existing Lists

A number of problems occur with the various lists: (1) the statutory purposes and list of substances may not be consistent; (2) the statute or regulations may have more than one purpose, each of which may require different lists; and (3) no explicit, risk-based criteria for listing substances may have been defined.

Inconsistency between statutory purpose and substances listed. Each statute and its implementing regulations have at least one, and often more, stated purposes. For example, section 307 of the CWA is intended to limit toxic releases to surface water of substances that could have adverse effects on health or the environment, whether such effects arise from short-term or long-term release and exposure. And yet, it is incorporated into CERCLA immediate reporting requirements by reference. When lists are mandated, the substances included within the criteria do not always address the multiple purposes of the Act or section. CERCLA's list of hazardous substances is a case in point. The primary purposes of the list are several: (1) to ensure that the federal government is notified of releases so it may determine whether a federal response action is needed; and (2) to trigger liability, site listing or other section 104 activities. However, two of the lists included under CERCLA —the CAA NESHAP and the CWA section 307 lists —were developed to control substances often routinely released to air and water. While such releases may represent instances of concern to the federal government to address subsequent clean-up or for other follow-up actions and therefore need to be reported, they may not represent releases for which a federal emergency response should be mobilized. Thus, for purposes of identifying emergency releases, the CERCLA listing is overly-inclusive. A similar problem exists in EPCRA. The statute mandated annual inventory reporting for any chemical considered a hazardous chemical by OSHA. The OSHA criteria, however, cover substances that

pose hazards to workers; many OSHA hazardous chemicals are unlikely to pose any hazard to the community in the event of a release. Therefore, the burden of annual reporting may be excessive.

Inconsistent statutory purposes. When statutes have more than one purpose, the list of chemicals developed may not be appropriate for the different goals. Again, CERCLA is the best example of this problem. Section 103's stated purpose is notification of the federal government for response evaluation, whether short or long-term. The agency has implied a second purpose: to develop data on accidental releases to assist regulatory development, especially for accident prevention. This second purpose could result in a need for a different list. In the context of the second purpose, EPA may need information on substances whose accidental release may immediately impact public health or the environment, even when no federal response is needed or feasible.

No risk-based criteria for listing. If the technical criteria used to list chemicals are not specified (e.g., toxicity levels), determining whether the listed substances are consistent with the regulatory purpose is problematic. In addition, the basis for adding or deleting chemicals from a list becomes unclear. The agency may find it difficult to justify adding a substance when risk-based criteria do not exist; the agency and industry may find it difficult to argue for delisting when the reason for listing is unclear. A number of the existing lists were developed without specific criteria. For example, while revisions to the EPCRA section 313 list are criteria-based, the original list was a mandated compilation of two state lists, one of which was the result of a survey of chemical use in the state. The OSHA list of highly hazardous chemicals was also selected from other lists, some of which do not use clear risk-based criteria for listing.

INTERNATIONAL HARMONIZATION OF HAZARD CLASSIFICATION[2]

The international community recognized the benefits of harmonizing hazard classifications worldwide and has begun addressing this area through several fora, including the Organization for Economic Cooperation and Development, the International Labor Organization, and the International Program for Chemical Safety. A March 1992 paper on the U.S. Government Policy for Harmonization of Chemical Safety and Health Information explored the policy implications of harmonization. From that paper, the United States is not the only country that has developed an information-based regulatory scheme to protect workers and the public from hazardous chemicals. While there are a number of countries, or international organizations that have adopted some requirements in this area, there are two, in addition to the U.S., that are of major significance to workers and consumers. The European Community has directives which address classification and labeling of substances and preparations, and recently adopted one that requires material safety data sheets for preparations. Canada has also adopted rules, most notably ones which require labels and material safety data sheets for chemicals in the workplace.

In transport, many countries' authorities, including the U.S. Department of Transportation, follow the recommendations of the United Nations' Committee of Experts on the Transport of Dangerous Goods. This UN Committee has developed harmonized criteria for hazard definitions that are applied to the transport sector. These definitions focus on physical hazards and acute health hazards. Thus, there are a number of major existing systems which are similar in intent, but different in specific provisions. The result is a patchwork of conflicting and diverse national and international requirements.

Because of the variations in classification criteria, the same chemical may be classified as having different degrees of hazard, and require different warning statements, depending on the classification system being applied in a given situation. Differences multiply when warning statements are also considered, due to the variety of symbols and terminology from system to system. To market or ship a product, companies must grapple with these different systems. These differing requirements may therefore constitute a technical barrier to trade, and be problematic for companies exporting or importing chemicals, especially small

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[2] This information was extrapolated from the United States' Government Policy paper, March 1992, on "Harmonization of Chemical Safety and Health Information."

companies. In addition, the proper protection of workers and other users of chemicals imported from countries which provide less protection is a primary consideration.

The current U.S. rules on classification and labeling are not consistent within the domestic regulatory scheme, but modifications to any or all of these systems are possible to achieve harmonization. A benefit of domestic harmonization would be to assist U.S. policy in international harmonization. While this may be difficult in some situations, particularly where the requirements are statutorily mandated, the long-term benefits of achieving the goals of consistency in approach, and elimination of conflict or duplication, warrant further action and commitment to accomplish it.

GAPS IN HAZARDOUS MATERIALS SAFETY SYSTEM

When looking at the entire regulatory and statutory structure for hazardous materials safety, significant program gaps do not exist. There is far more overlap and inconsistency, rather than gaps. However, the gaps which do exist add to the confusion of the system, and may represent serious deficiencies in the system.

Technical Data Gaps. Long-term health and ecological effects from chemical accidents are unknown. Developing criteria which take such effects into consideration is difficult because of the nature of the scientific data available and the relative scarcity of study events. However, further study and consideration of these issues should be on the agenda.

Ecological effects are insufficiently considered in the criteria for evaluating accidents. Most chemicals are controlled based on their potential impacts on human health or safety. It has been presumed that protecting human health will protect environmental health. However, this has not necessarily proven to be correct. Predicting the consequences to the environment from a given release is difficult, given the broad range of target populations and their varying sensitivities. A simple toxicity threshold would be so inclusive as to be almost meaningless, whereas a gross quantity threshold is inconsistent with the established statutory and regulatory schemes and might miss events which, because of their location or other criteria may have catastrophic environmental consequences. Further consideration of this issue is warranted.

Agencies create, use, and share with one another a wide range of data on hazards in the course of developing or implementing regulations. Such information is useful to regulatory agencies in determining criteria for thresholds of hazard reporting. One problem is that agencies may not be aware of data that other agencies may have, or, when agencies have to rely on technical data from outside sources, the information may not be complete or verifiable. Adequate data is not available or may be costly to obtain, in some cases, to verify information regarding some of the chemicals already listed as hazardous.

Gaps in scientific knowledge, whether among agencies or in external sources of information result in regulatory gaps. For example, many data bases focus on acute human toxicity data, which downplay the importance of substances that pose longer term human health effects or ecological effects. Even when acute human toxicity is a factor, the specified level of concern may be based on various animal models or occupational experience, which may not be appropriate for the general population. Similarly, when longer term effects are analyzed, the end point of concern is usually based on cancer, even though other health effects may be of greater concern. Databases, also often do not have sufficient information on otherwise non-toxic substances that pose significantly different or more toxic effects when co-mingled with other substances or allowed to react in water or air.

Gaps in Coverage. Far more significant on a day-to-day basis in the regulatory scheme which has been imposed are the gaps which occur because of the inconsistencies in statutory and regulatory definitions of chemicals, incidents, and covered entities. As indicated in more detail elsewhere, when chemicals are listed by name, very similar or even identical chemicals may not be included in the regulatory scheme; when chemicals are listed by number, similar chemicals with different numbers are left off; when federal facilities are covered by one statutory scheme, but not another; when state and local government entities are covered by some regulations but excluded by other similar requirements because of nuances in definitions; or when

one industrial classification is covered, but another using identical chemicals is excluded because of reliance on classification schemes unrelated to the purpose of the law, the resulting patchwork may result in gaps of protection, unintended by the statutory or regulatory scheme.

An illustration of these gaps is the 1991 train derailment resulting in a metam sodium spill near Dunsmuir, California. Metam sodium is not a listed substance under CERCLA, nor was the product shipment regulated by DOT as a hazardous material. However, its release was subject to CERCLA notification and liability provisions because metam sodium rapidly hydrolyzed and decomposed into three different listed hazardous substances, and became a hazardous waste listed under RCRA. The rail company was fined after the accident, based on the RCRA provision because the substance, metam sodium, became a waste and therefore subject to government regulation when it leaked into the river as a result of the accident.

STATUTORY AND REGULATORY FINDINGS

Statutory Definitions. At least nine laws with different terms and definitions for regulated substances or reportable events are administered by the regulatory bodies. These laws differ in the terminology used to define the hazards addressed, i.e., hazardous substance, hazardous material, pollutant, etc., the regulated community, and the reportable event (i.e., spill, release, accident, incident). Because these laws and regulations were enacted independently of one another, and often contain multiple purposes, including hazardous materials safety provisions, the definitions are often confusing for the regulated community, as well as the regulators. Further, many of the current different terms and definitions for hazardous materials address long-term environmental problems, in addition to the provisions for emergency situations, further complicating the issue.

Multiple terms and definitions confuse the regulated community about when reporting for emergency events is necessary and confuse responders about what materials are harmful in such events. Development of more uniform terminology for regulated substances and reportable events is necessary to eliminate such confusion. The impacts of selecting more uniform terminology should be studied, particularly as they affect the regulated communities and the existing regulatory structure. Such consideration should include the impacts on data collection, management and analysis. After further study, statutory changes may be recommended.

Multiple Hazard Classification Systems. Based on Congressional and judicial mandates, each of the regulatory agencies —DOT, EPA, OSHA —has different systems for identifying, classifying and listing hazards. These hazard classification systems, including the various chemical lists, form the basis for safety programs because they currently control what facilities and companies are regulated, what regulations must be complied with, who has to report for prevention, planning or accident notification and investigation purposes, and what must be reported to the federal, state, and local governments. In addition, existing hazard classification systems control such specific safety functions as prevention, clean-up, liability, and notification for preparedness, planning, and response. Numerous regulatory lists of chemicals have been established, seven of which directly relate to accident prevention, preparedness, and response. The statutes from which hazard classification systems, including mandated lists, are derived include: Clean Air Act, Emergency Planning and Community Right-to-Know Act, Comprehensive Environmental Response, Compensation and Liability Act, Resource Conservation and Recovery Act, Federal Water Pollution Control Act, Occupational Safety and Health Act, Hazardous Materials Transportation Act.

Among the factors contributing to problems in developing hazard classification systems are: (1) the statutory purposes and listed substances are not always consistent; (2) the statute and regulations serve more than one purpose, each of which may require different lists; (3) statutes that specifically list chemicals reduce flexibility in list management; (4) explicit risk-based criteria and supporting data for listing substances are not always defined; and (5) overlaps, gaps in coverage, and technical data problems result from current lists. Specifically gaps include knowledge of long-term health and ecological effects from chemical accidents. Developing criteria which take such effects into consideration is difficult because of the nature of the scientific data available and the relative scarcity of study events. Complicating this problem is the lack of standard chemical nomenclature for purposes of chemical identification. Further, the lack of consistency in

hazard classification systems among regulatory agencies may deter the United States' ability to move toward international harmonization, and may affect future competitiveness of U.S. chemical companies abroad.

Harmonizing the existing regulatory agencies' different classification systems into a primarily criteria-based system requires that each agency regulating the same materials uses common identifiers, definitions, and universe of criteria. A process to accomplish such harmonization is a necessary and important step toward improving the hazardous materials safety system. Rationalizing the domestic hazard classification system to facilitate international harmonization, such as DOT has done, should be an intended and achievable goal. Since many chemical lists included in various agencies' domestic hazard classification systems are currently mandated, statutory changes will ultimately be necessary. Development of an internationally uniform hazard classification system presents considerable challenges because it entails both domestic harmonization as well as the coordination of multiple international organizations, interests, and other hazard classification systems.[3] Additional analysis and coordination is needed to consider and develop a long term plan for domestic harmonization, in keeping with the goal of international harmonization. Developing such a plan will necessitate identification of the statutes which may need to be revised to ultimately achieve such goals.

Coordination of Hazardous Materials Prevention Programs. The number of different statutes designed to control and regulate hazardous materials has created problems for the regulated community and the regulators alike. Confusion, redundancy, overlaps, inefficiencies, and in some cases gaps in responsibility have resulted from the composite of laws and regulations guiding the existing safety system. Specifically, problems exist in terminology as previously indicated; contradictions occur in regulations because different statutes and regulations address many of the same universe of materials; and, gaps and inconsistencies exist in technical data, and in some of the criteria used for classifying hazards, i.e., long term health and ecological impacts. Some statutes require coordination. In many instances, agencies themselves develop Memoranda of Understanding to define specific responsibilities and avoid overlap or regulatory conflict. However, in many cases, regulations, developed independently, result in unintended, negative impacts on other regulators and the regulated community. While agencies can participate in regulatory development through public comment, early discussions and information-sharing among agencies about prevention matters may stem some of the problems inherent in the existing system.

As a result of the work of the National Response Team on this report and on a report on the Federal Government Control of Hazardous Materials, the NRT has established a Prevention Committee to foster a dialogue among its members on matters regarding development and promulgation of hazardous materials and oil spills prevention programs at the federal level. The objectives of this Committee are to: 1) provide and facilitate communication and information exchange regarding prevention activities; 2) maintain awareness of interagency federal hazardous materials and oil spill prevention activities; and 3) promote the coordination of prevention activities among the federal agencies, in particular those of inter-agency interest.

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[3]Harmonization of hazard classification systems for international transportation has been ongoing since 1953 through the United Nations Committee of Experts on Transport of Dangerous Goods. DOT/RSPA provides U.S. representation on the U.N. Committee and serves as the principle U.S. delegate. Also, more recently, under the auspices of the State Department, a U.S. interagency group, along with other representatives from the Organization for Economic Cooperation and Development (OECD) has been established to determine if and how international harmonization of at least one set of criteria, i.e. acute toxicity, will be possible. The OECD will be expanding its efforts in the area of harmonizing chemical classification to cover various classes of materials. In conjunction with the harmonization efforts, the International Labor Organization, World Health Organization, Commission of European Communities, United Nations Environment Program and International Program on Chemical Safety have all been actively involved.

CHAPTER 5. CONTINGENCY PLANNING FOR HAZARDOUS MATERIALS ACCIDENTS

INTRODUCTION

The government system for contingency planning for accidents involving hazardous materials is complex. During the last three decades, the public safety responsibilities for hazardous materials at the local, state, and federal government levels have expanded. Today there are increased demands upon government and industry to plan, train, and equip response personnel for a variety of hazardous materials emergencies. Coordination of prevention, preparedness, and response efforts among a wide range of potential players and stakeholders is critical considering the number of different plans now required and prepared by various federal, state and local agencies and industry.

Hazardous materials accidents begin as local events, and in the large majority of incidents are handled solely by industry or local government officials. Facilities, whether chemical, petroleum, or nuclear, are obligated to initially respond to and contain an emergency within the bounds of their confines. Many industries are required by a variety of statutes to develop plans to address various hazardous materials accident contingencies.

Historically and today, local first responders -- fire and police -- respond to those chemical events that threaten public health and safety. Local fire and police also respond to and mitigate the effects of numerous, daily transportation accidents or incidents involving hazardous materials. A hazardous materials emergency that exceeds the capabilities of local governments may require response support from the State or federal government. Accordingly, plans also exist at the federal and state government levels to address the various levels of hazardous materials contingencies. The federal response system described in this Chapter builds upon the local and state planning infrastructure. Federal response is generally limited to the very rare and serious hazardous materials emergencies.

This chapter focuses on the complexity of the existing planning structure at the local, state and federal levels and within industry. The chapter is organized to describe federal contingency plans and planning structures; state, local and area contingency plans and planning bodies; and federally mandated facility contingency plans. And finally, those planning coordination issues which are most likely to impact responses to future events are examined.

FEDERAL HAZARDOUS MATERIALS CONTINGENCY PLANS & PLANNING STRUCTURES

Three distinct, interrelated plans guide the federal government's response to hazardous materials accidents. These plans are authorized by a variety of different statutes and Executive Orders. The plans, although coordinated with one another, are primarily designed to address distinct types of federal responses. Two of the plans, the National Oil and Hazardous Substances Pollution Contingency Plan, better known as the National Contingency Plan (NCP) authorized in the Federal Water Pollution Control Act, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Federal Radiological Emergency Response Plan (FRERP), address responses to specific types of hazardous materials accidents. The NCP addresses oil and hazardous substance accidents; the FRERP addresses accidents involving significant releases of radioactive materials. The third major federal plan, known as the Federal Response Plan (FRP), initially drafted as a catastrophic earthquake contingency plan in 1984, is the federal government's primary plan for coordinating responses to catastrophic natural and manmade disasters, which may include hazardous materials or radiological accidents.

Each plan has its own structure and is overseen by a separate coordinating body. Following is a description of the basic provisions of each plan, the organizational structure for plan implementation, and how the plans have been coordinated.

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP)

NCP Scope. The scope of the NCP includes: (1) discharges of oil into or upon U.S. navigable waters and adjoining shorelines, the waters of the contiguous zone, the high seas beyond the contiguous zone, and certain other discharges warranting response under CWA section 311; (2) releases or threatened releases into any media of hazardous substances warranting response under CERCLA; and (3) such releases or threatened releases of pollutants or contaminants which may present an imminent and substantial danger to public health and welfare and the environment warranting response under CERCLA. As indicated in Chapter 4, a chemical list comprised of over 700 substances is used by the federal government to identify releases of hazardous substances that may require response under the NCP.

Under the authority of CERCLA, the CWA, the Oil Pollution Act, and other statutes, the NCP functions both as an emergency response plan as well as the plan for non-emergency removal and remedial responses at hazardous waste sites.

NCP Organization and Responsibilities. For emergency responses, the NCP establishes the general organization and responsibilities of federal agencies. Three fundamental emergency-related activities are performed under the NCP:

(1) Preparedness planning and coordination for responses;

(2) Accident notification and interagency communications; and,

(3) Response operations at the scene of a discharge or release.

The organizational elements created to perform these activities include:

(1) The National Response Team (NRT) is comprised of 15 member agencies and departments charged with developing policy for federal preparedness and response; coordinating regional planning; providing policy guidance and support to the Regional Response Teams; and coordinating federal response to nationally significant events. The Chair of the NRT is an EPA representative; the Vice Chair is a Coast Guard representative. During periods of activation, the chair is a representative of the member agency providing the On-Scene Coordinator (OSC).

(2) Regional Response Teams (RRTs) are comprised of designated regional representatives from each participating NRT agency, together with state, and in some instances local government representatives. RRTs are charged with regional planning and preparedness activities and providing advice and support to the OSC. Regional Contingency Plans (RCPs) serve as the basis for OSC operations and RRT support during a response.

(3) The OSC or Remedial Project Manager is primarily responsible for directing federal response efforts and coordinating all other efforts at the scene of a discharge or release. The NCP allows for the development of Area contingency plans for this level of response.

(4) The National Response Center, located at USCG Headquarters, is continuously manned for handling activities related to response actions. It provides a single point of contact for all pollution incident reporting, and operates as the NRT communication center.

(5) The National Strike Force Coordination Center, located in Elizabeth City, North Carolina, may assist the OSC by providing information on available spill removal resources, personnel, and equipment.

(6) Area Committees are primarily oil pollution preparedness and planning committees that support the OSC particularly in oil pollution responses at the area level. Area Committees prepare Area Contingency Plans (ACPs), plan for joint responses with state and local governments, and expedite decisions for the use of dispersants and other mitigating substances and devices.

Under the NCP, EPA and the Coast Guard are the agencies primarily charged with providing predesignated OSCs for emergency responses to accidents, with the exception of accidents occurring at certain federal facilities. When an accident occurs at a DOD or DOE federal facility, the agency is responsible for designating an OSC and managing the response in coordination with the NRT.

When a hazardous materials emergency occurs internationally and U.S. assistance is sought, the National Response Team, with the special assistance from the Department of State on the international aspects of the event, may undertake response activities.

The NCP specifies that the Coast Guard provide OSCs to respond to discharges or releases threatening the coastal zone and EPA provides OSCs for the inland zone. EPA is responsible for providing OSCs for removal actions, including emergencies, and Remedial Project Managers for all remedial actions. Maps contained in the RCP establish the boundaries for each agency's response authority. In practice, however, if the Coast Guard is closer to an accident site, it will manage the response until the EPA OSC arrives and vice versa. Differences in accident situations which the Coast Guard and EPA may have to address, as well as the differences in history, purpose, and organization of each agency, have led to unique structures for planning and response within each agency. The Coast Guard predesignates OSCs for a given area, so that they are familiar with the area in which they may be required to respond, whereas the EPA's regional approach varies.

In EPA headquarters, the responsibilities for planning and for response -- removal and remedial -- are within the Office of Solid Waste and Emergency Response. The Office of Emergency and Remedial Response oversees the development of federal regulations pertinent to contingency planning and response, as required by CERCLA, CWA section 311, and the amendments to CWA section 311 in the OPA, and has primary responsibility for implementing the NCP, including remedial, removal and emergency response operations, and making necessary changes to the NCP. The Chemical Emergency Prevention and Preparedness Office is primarily responsible for developing regulations pertinent to local and state activities as required by EPCRA, and for prevention as required by the CAA as amended. This office also coordinates EPA Headquarters operations during a large scale emergency response and its director chairs the NRT.

With the enactment of EPCRA, and more recently with the passage of OPA, new plans and planning bodies have been added at various levels of government thus requiring additional coordination and inclusion within the NCP. Plans and planning structures required by these Acts are discussed in separate sections of this chapter.

While the NCP has evolved as the primary plan for hazardous materials emergency response, coordination with two other existing federal plans, as described following this section, and with state and local planning bodies is necessary.

Oil Pollution Act (OPA) Contingency Planning Requirements

Within the National Response System of the NCP, the Oil Pollution Act of 1990 created additional planning structures and requirements to reduce oil spills and to improve the nation's preparedness and ability to respond to them. OPA amends in part the Federal Water Pollution Control Act and contains certain

provisions enhancing response authorities to clean up oil spills. Specifically, OPA addresses four primary contingency planning responsibilities. OPA directed the Coast Guard:

- To establish a National Response Unit at Elizabeth City, NC, which is to maintain a comprehensive list of spill removal resources; provide technical assistance, equipment and other resources to federal OSCs; provide technical assistance for Area Contingency Plans; administer Coast Guard Strike Teams; and maintain files and review Area Contingency Plans; and

- To establish District Response Groups to provide assistance to the OSC, maintain response equipment, provide Area Contingency Committee assistance, and review Area contingency plans.

OPA also directed the President:

- To designate areas for Area Committees to develop Area Contingency Plans; and,

- To issue regulations for tank vessel and facility response plans.

The OPA establishes Area Committees which are responsible for more local contingency planning for oil spills. The Area Committees coordinate with and include representatives from state and local governments. The Coast Guard, through the Department of Transportation, and EPA were delegated responsibility by the President for identifying Areas and establishing Area Committees, which will then develop Area Contingency Plans. Responsibilities were divided between Coast Guard and EPA, consistent with the NCP. Each agency published notices in the Federal Register in April, 1992 which outlined the procedures for designating the Areas and Area Committees.

EPA's initial approach to designating areas and Area Committees was to adopt the existing structure of the NCP, using the ten federal regions and three areas, each of which have existing Regional Contingency Plans (RCPs) and Regional Response Teams (RRTs). EPA indicated that authority to designate smaller or subregional areas will be delegated to its Regional Administrators. Designation of those areas will be based on analysis of potential risks for oil spills and the environmental sensitivity of areas within each region. According to the notice, EPA Regional Administrators who designate new areas would consult with the RRTs on Area designations and Area Committee appointments. The EPA notice also indicated that representatives from State Emergency Response Commissions and Local Emergency Planning Committees would be included on Area Committees.

The USCG's approach to developing Area Committees is specified by Commandant Notice 16471. This directive specifies that the Coast Guard will establish Area Committees in the Coastal Captain of the Port Zones identified in Federal Register Notice (57 FR 15201). These Area Committees will be developed by Coast Guard Commanding Officers of Marine Safety Offices and Captains of the Port with responsibility for areas designated in the Federal Register.

In addition to the responsibilities of the Coast Guard and EPA for implementing OPA mandates, DOT's Research and Special Projects Administration also anticipates that it will regulate the contingency planning requirements for pipelines and non-marine onshore transportation facilities including pipelines, cargo tanks, tank cars and portable tanks. The transportation modes will enforce new regulations and RSPA will enforce regulations applicable to portable tanks and pipelines.

The Federal Radiological Emergency Response Plan (FRERP)

FRERP Scope. The Federal Radiological Emergency Response Plan (FRERP) is a plan that describes how 17 federal agencies agree to coordinate their actions in responding to a peacetime radiological emergency. Its authority is derived from the individual authorities of its signatory agencies. Each agency has

its own internal plans for implementing its role in the FRERP. A central feature of the FRERP is that each agency has agreed to fulfill its obligation in coordination with the other agencies, while utilizing their own funds and authorities. Appendix 5-A shows the authorities used as a basis for the FRERP.

The FRERP has evolved over the past decade. Under Public Law 96-295, 1980 NRC Appropriations Authorization the President was directed to prepare and publish a plan to assure an expeditious, efficient, and coordinated federal response to an accident at a commercial nuclear power plant. The President delegated responsibility for the development of this plan to the Director of FEMA in Executive Order 12241 and FEMA published the "National Radiological Emergency Preparedness/Response Plan for Commercial Nuclear Power Plant Accidents Master Plan" in December 1980.

While the "master plan" was developed only for commercial nuclear power plant accidents, FEMA subsequently developed and published the Federal Radiological Emergency Response Plan (FRERP) in November, 1985. The FRERP covers any peacetime radiological emergency that has or is expected to have a significant radiological effect on U.S. territories, possessions, or territorial waters, and that could require a response by several federal agencies.

Emergencies occurring at fixed nuclear facilities or during the transportation of radioactive materials, including nuclear weapons, which affect the U.S. fall within the scope of the plan, regardless of whether the facility or radioactive materials are foreign or domestic, publicly or privately owned, federally regulated, or regulated by an "Agreement" state.[1] However, unlike the NCP, the FRERP does not contain detailed clean-up responsibilities. After a response, according to the FRERP, long-term environmental clean-up may be undertaken using CERCLA authorities and procedures established under the NCP. However, CERCLA does not cover commercial nuclear power plants.

A FRERP activation is the responsibility of a Lead Federal Agency, based upon its professional judgment that the event is expected to have a significant radiological impact and that the response of several agencies is required. Because radionuclides are a hazardous substance under CERCLA, releases of such materials above threshold quantities regulated under CERCLA must be reported to the National Response Center (NRC). Since these thresholds are purposely set at low levels, required reporting to the National Response Center does not necessarily lead to FRERP activation.

FRERP Organization and Responsibilities. The Lead Federal Agency designated in charge of a response under the FRERP depends upon the character of the event, and will be either EPA, the Nuclear Regulatory Commission, DOD, DOE, NASA, or DOT. For emergency responses, the FRERP establishes the general responsibilities of federal agencies. Three fundamental activities are performed under the FRERP:

(1) developing recommendations for protection of the public and presenting them to state and local officials for action;

(2) coordinating off-site radiological monitoring and assessment; and

(3) coordinating public outreach, including communications, public and congressional affairs, and reports to the president and international agencies.

The Federal Radiological Preparedness Coordinating Committee (FRPCC), the coordinating body for the FRERP, is comprised of the seventeen federal agencies with responsibility for implementing the FRERP should the need arise. Established by regulation, it has five standing Committees. FEMA chairs the FRPCC and two of its standing committees. In addition, FEMA is responsible for coordinating non-

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[1] Under the Atomic Energy Act of 1954, the Nuclear Regulatory Commission has relinquished to certain states its regulatory authority for licensing the use of source, byproduct, and small quantities of special nuclear material.

technical response on-scene. Regional assistance committees were also established for coordinating activities at the regional level.

FRERP Changes. The FRERP is being reviewed to specify precisely the Lead Federal Agencies for all types of events and to change the names of its organizational structures to conform with standard federal terminology. A new annex to the Federal Response Plan is being written to facilitate the integration of the FRERP when an emergency is declared under the Stafford Act. Revisions to the FRERP will include language describing its relationship to the Federal Response Plan.

Response Funding and Liability Provisions Pertinent to FRERP Responses. While the FRERP details how federal agencies will coordinate for a radiological response, it does not, however, confer additional authority or funding. However, for a large event, some reimbursement of expenses is expected from Stafford Act funding.

FRERP Exercises. Several exercises have been conducted to test the operation of the FRERP. The interim FRERP was tested in March 1984 during an exercise at the St. Lucie Power Plant in Florida, and in July 1987, the fully operational FRERP was tested at the Zion Power Plant in Illinois. A tabletop exercise conducted at the Riverbend Nuclear Power Facility in Louisiana in September 1991 further tested the FRERP.

The Federal Response Plan (FRP)

FRP Scope. In 1988, the Disaster Relief Act of 1974 was amended and retitled the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The Stafford Act authorizes the President to assist states and local governments in situations that are beyond their response capabilities. Upon the request of a Governor for assistance, the President may declare that a major disaster or an emergency exists in a state. Such a declaration may be made as a result of a natural catastrophe such as a hurricane, tornado, high water, incident, tsunami, earthquake, volcanic eruption, landslide, snowstorm, or, regardless of cause, any fire, flood, or explosion. Thus the FRP was developed to facilitate and coordinate the immediate and life-saving assistance to be provided by the federal government for catastrophic disasters.

FRP Organization and Responsibilities. To expedite federal assistance, the Federal Response Plan describes a functional concept of operations organized by Emergency Support Functions (ESFs), to group the types of federal assistance that a state is most likely to need during a disaster or emergency. These functions include transportation, communications, public works and engineering, firefighting, information and planning, mass care, resource support, health and medical services, urban search and rescue, hazardous materials, food, and energy.

The ESFs serve as the primary mechanism for providing federal assistance to state needs generated by a disaster. The Federal Response Plan outlines the basic missions of each ESF. Each ESF is headed by a "primary" or lead federal agency, with other agencies providing support, as necessary, to carry out the designated function. Primary agencies have been assigned on the basis of their authorities, resources, and capabilities in the particular functional area.

Depending on the requirements of the situation, some or all of the ESFs may be utilized to provide the necessary assistance to the state. Federal assistance is provided to the affected state under the overall coordination of the Federal Coordinating Officer, appointed by the Director of FEMA on behalf of the President.

During a major disaster, the FRP Catastrophic Disaster Response Group (CDRG) —managed by FEMA and composed of 27 agencies —is convened to coordinate resource decisions.

Hazardous Materials Response under the FRP. Emergency Support Function (ESF) #10 is the hazardous materials annex for an FRP activation. The purpose of ESF #10 is to provide a coordinated response to actual or potential discharges and/or releases of hazardous materials through the response

mechanisms of the National Contingency Plan (NCP). Under the ESF #10, the NCP is used to address hazardous materials problems caused by a disaster that results in a declaration under the Stafford Act. The Environmental Protection Agency, with the support of several other departments and agencies, is the primary agency for ESF #10, Hazardous Materials.

FEMA activates and coordinates the FRP. Once activated, either the primary or support agencies for ESF #10, or FEMA, may initiate use of the Hazardous Materials Emergency Support Function as needed, which then triggers the National Contingency Plan.

Radiological Support under the FRP. Emergency Support Function #13 is now under consideration to provide the FRP/FRERP linkage for radiological emergencies which might result from an incident requiring activation of the FRP.

Experience with the FRP. While Stafford Act funding is administered by FEMA routinely, (approximately 23 times per year), to the states for responses to various emergencies, the Federal Response Plan had never been fully activated for response to a catastrophic emergency until Hurricane Andrew (1992), nor had either of its Emergency Support Functions for hazardous or radiological accidents been activated. At least once a year, major exercises are undertaken to test and improve the plan. During the federal response to Hurricane Andrew, both the FRP and its hazardous materials annex (ESF #10) were activated. A limited number of minor spills and damage to hazardous materials facilities were addressed during the catastrophe and some problems were encountered in gaining accessibility to the hazardous materials sites. However, no significant damage involving hazardous materials was encountered.

FINDINGS REGARDING FEDERAL HAZARDOUS MATERIALS CONTINGENCY PLANNING

- Multiple laws and regulations developed independently from one another have resulted in an expansive contingency planning structure for the federal government.

- The federal infrastructure for hazardous materials contingency planning is directed primarily at large accidents because of the economic, environmental, geographic, safety and political problems which arise when such accidents occur.

- At the federal level, different contingency plans and coordinating bodies for federal response to large accidents have been developed. The primary purpose of federal planning and response is to provide resources to the state and local community when their resources and technical expertise are overwhelmed by the size or implications of a large accident.

- The planning infrastructure for large, though relatively rare accidents, is complex. It requires significant coordination between and among agencies at the federal, state and local levels.

- Two primary federal plans, each with a specific focus, address contingency planning for responses to hazardous materials accidents: the National Contingency Plan (NCP), first drafted in 1968, for oil spills and accidents involving hazardous substances; and the Federal Radiological Emergency Response Plan (FRERP), for significant accidents involving radioactive materials releases.

- A third major federal contingency plan, the Federal Response Plan (FRP), initially drafted in 1984, is intended to address catastrophic disasters, regardless of cause. Therefore, hazardous materials and significant radiological accidents resulting from natural and man-made catastrophes may be included in an activation of the Federal Response Plan.

- There are similarities in the primary components of each of the federal plans which address hazardous materials. These include:

- ▸ Each of the three major plans establishes a coordinating structure or mechanism;
- ▸ Each defines responsibilities during a major emergency for federal, regional levels and on-scene response; and,
- ▸ Each specifies coordination with state and local response agencies.

- While these similarities exist, the plans are distinct. They are revised and managed by different coordinating bodies.

- Differences also exist in the basic components and procedures adopted by the plans. Many of the same agencies, sometimes with representatives from different offices, serve on the coordinating bodies, dependent upon the scope of the plan. Seventeen agencies serve on the FRERP coordinating committee, the FRPCC; the FRP coordinates with 27 different agencies in the event of a major catastrophe; 15 federal agencies comprise the National Response Team, coordinating body for the NCP.

- The NCP and FRERP have some important characteristics in common. Both describe a federal technical response to an emergency with support coordinated or provided by other federal agencies.

  In contrast, the FRP provides an umbrella for federal coordination of response agencies and actions, which may provide technical and non-technical emergency support. It relies on the specific hazardous materials plans, the NCP, the FRERP, and the expertise of responding agencies, to respond to technical issues in an accident, and the authorities of these plans to initially pay for clean-up or cover liability, if appropriate.

- With the passage of the Oil Pollution Act of 1990, the formation of Area Committees and Area Contingency Plans for responses to oil spills in both coastal and inland zones was required, adding new potential for overlap to the existing planning infrastructure. According to the law, state and local representatives are to be included with federal representatives on the Area Committees. Both EPA and the Coast Guard are integrating Area Committees into the existing planning system, predominantly established by the National Contingency Plan.

STATE AND LOCAL CONTINGENCY PLANS & FEDERALLY MANDATED REQUIREMENTS

Because response to chemical emergencies always begins as a local response, the first level of planning will be necessarily local in nature. Such planning may encompass plans for a specific location (site-specific plans) or a community-based hazardous materials contingency plan, or materials specific plans such as those for oil required under the Oil Pollution Act. All contingency plans, however, are likely to use some of the same basic steps such as hazard identification and analysis, resource identification, and plan preparation. Initial local planning for hazardous materials emergencies began with local fire departments called on to respond to such emergencies. In the early 1970s, some large metropolitan Fire Departments began organizing hazardous materials units.

All-Hazards Emergency Operations Plans (EOPs)

The Federal Emergency Management Agency (FEMA), through its Comprehensive Cooperative Agreement (CCA) Program with state governments, has developed an emergency management infrastructure at the state and local level that routinely supports local and state fire and police in a variety of "all hazards emergencies," including those involving hazardous materials. Local and state governments have All-Hazards Emergency Operations Plans in place that have been developed with FEMA financial and technical assistance over many years. These plans are periodically reviewed by FEMA, revised, and tested in both simulated and real emergencies. As a result of this Federal assistance, an emergency management

infrastructure exists at the state and local level which provides ancillary response equipment, comprised of warning and other response equipment and facilities, and trained personnel. The authority for All-Hazards plans originated with the Civil Defense Act of 1950, and was expanded by the various statutes of the last two decades to address all emergencies regardless of cause.

The focus of the All-Hazards plans is on response functions that are common to any type of emergency, including: communications; command and control; and warning. All-Hazards EOPs contain hazard-specific annexes unique to the individual hazard, for example, an annex for hurricanes which addresses considerations for evacuation, and warnings, etc. that are unique to these events. FEMA guidance has required the states to add a hazardous materials annex, addressing response to fixed facility and transportation events, since the early 1980's. Since the enactment of EPCRA in 1986, as discussed below, most states have adopted provisions for emergency planning and community right-to-know, as specified by the Act and its implementing regulations. As suggested in the Hazardous Materials Emergency Planning Guide (NRT-1), many communities have adopted local emergency response plans as their hazardous materials annex under the FEMA All-Hazards planning structure.

Emergency Planning and Community Right-to-Know (EPCRA) or SARA Title III

The legislation applies to facilities using certain chemicals, including those listed as extremely hazardous substances. EPCRA required that the Governor of each state to create State Emergency Response Commissions (SERCs), which in turn designated Local Emergency Planning districts and Local Emergency Planning Committees (LEPCs) for each district. The law also specified the composition of the Local Emergency Planning Committees to include the range of representatives who would have a stake in both the planning process and a response. Among the types of members required by the law were representatives from local government agencies such as fire and police departments, facility representatives, the media, hospitals, and citizens.[2]

The major feature of the law is the requirement that Local Emergency Planning Committees, in cooperation with industry, develop local contingency plans. Other significant features of the law include notification requirements regarding chemical inventories and releases of regulated substances, a training grant program and enforcement provisions. Additionally, it should be noted that this legislation does not pre-empt any State or local laws on this subject.

As a part of the implementation of this statute, the National Response Team published a guidance document on contingency planning for local communities. The EPCRA statute specified that federal review of LEPC plans must be initiated by the LEPC. Whether the Regional Response Teams under the NCP review LEPC plans is optional and contingent upon the request of the LEPC. EPCRA did not impose a federal review process on state and local communities.

The intent of EPCRA was to provide additional tools (e.g., information about chemical risks in communities) to the state and local governments for hazardous materials contingency planning, as well as to involve a greater number of people in the hazardous materials planning process. EPCRA was not federally funded, nor was significant federal monitoring of SERC and LEPC planning activities intended, as the Congress recognized these planning and response functions are primarily a state and local responsibility. Because coordination between and among federal, state, and local entities during an emergency response can be problematic, issues which will be further evaluated are: (1) how to achieve such coordination within the LEPC planning process; (2) how to encourage those communities that do not have LEPC plans to develop them; and (3) how to assure that planning, based on federal guidance and statute, is not duplicative.

Financing Local Contingency Planning. EPCRA did not authorize funding for program implementation. Therefore a number of states that have adopted their own legislation have implemented a

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[2] This discussion does not address one major aspect of EPCRA, section 313, annual reporting of toxic chemical releases, because this provision is not directly related to accident planning or response.

fee system for those facilities required to report under the provisions of the law. Some states are now experiencing difficulties with their fee systems because of inadequate facility compliance with reporting requirements. Those facilities that do comply do not want to bear 100% of the burden of program costs.

The 1990 HMTUSA provides grants to states for "developing, improving, and implementing emergency plans under EPCRA, including determination of flow patterns within a state and another state." The funding level is $5 million per year for six years.

Federal Facility Participation in EPCRA. Federal agencies, including those with federal facilities that may have significant amounts of extremely hazardous substances (EHSs), are not legally obligated to comply with EPCRA. However, EPA encouraged federal agency voluntary compliance with the emergency planning and notification requirements. In a 1990 interim study, EPA published an analysis of federal agency responses to a survey on voluntary compliance with EPCRA requirements. Twelve agencies initiated inventories of their extremely hazardous substances. Several agencies determined they did not have sufficient quantities of such materials to meet reporting requirements. Sixteen agencies indicated to EPA that they would direct their facilities to comply with emergency notification requirements, which include reporting releases of CERCLA hazardous substances and EPCRA extremely hazardous substances above reportable quantity levels. The Department of Energy, among others, has included EPCRA compliance in several DOE orders, thereby formally mandating that all of its facilities, whether government-owned, contractor-operated, or government-owned, government-operated, fully comply with all of the requirements of EPCRA. To help achieve this, DOE and EPA are jointly developing and presenting EPCRA training for federal facilities that will be open to all agencies of the federal government.

In a 1991 EPA survey of State Emergency Response Commissions for EPCRA activities, a total of 584 federal facilities were reported to be participating in EPCRA programs. Of the participating federal facilities, however, 384 were reported from Illinois, and another 73 were postal facilities reported in New Hampshire. These figures indicate either poor response or lack of information available for the survey, or lack of federal facility voluntary compliance with the laws. While it is voluntary policy for federal facilities to report accidents to state and local governments, some facilities' failures to report accidents under this law have resulted in skepticism and distrust by state and local officials of voluntary compliance by federal facilities.

State and Local Radiological Emergency Planning and Preparedness

As a result of the Three Mile Island nuclear power plant accident in 1979 and the subsequent Kemeny Commission report, recommendations were made for improving the planning and response capabilities of utilities, federal, state, and local governments for commercial nuclear power plant emergencies. One of its recommendations led to the assumption of the lead role for off-site radiological emergency preparedness activities by FEMA.

FEMA's Radiological Emergency Preparedness (REP) affects 70 commercial nuclear power plant sites and nearly 500 state, tribal and local government jurisdictions responsible for radiological emergency planning and preparedness, and the over 3 million people living within the 10-mile emergency planning zones around commercial nuclear power plants. DOE and DOD facilities and holdings are not included.

The 1980 Nuclear Regulatory Commission Appropriations Authorization established a new basis for the licensing of commercial nuclear power plants with respect to the role of emergency planning and preparedness. Adequate emergency planning and preparedness (including such requirements for off-site locations) was made a condition of licensure. The criteria of "reasonable assurance" was established as the basis for making determinations on the adequacy of off-site preparedness. The Nuclear Regulatory Commission was required to consult with FEMA in making licensing determinations regarding the preparedness of state and local governments. As a result of the increased focus by Congress on preparedness around commercial nuclear power plants, the Nuclear Regulatory Commission amended its regulations to upgrade emergency planning requirements and to require utilities to submit to the Nuclear Regulatory Commission their off-site emergency response plans, as well as those of related state and local

governments when applying for a license. Two Memoranda of Understanding provide the general framework for cooperation between the Nuclear Regulatory Commission and FEMA, one regarding planning and preparedness, and the other regarding incident response. The planning and preparedness Memorandum of Understanding also provides the specific framework for FEMA's support to the Nuclear Regulatory Commission's licensing process.

FEMA and the Nuclear Regulatory Commission published their joint guidance document, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, in November 1980. This document provided national planning standards and evaluation criteria for state and local governments and licensees to use in developing radiological emergency planning and preparedness for commercial nuclear power plant accidents, and it provided guidance for the Nuclear Regulatory Commission, FEMA, and other involved federal agencies to evaluate the adequacy of off-site emergency planning and preparedness and to make the finding of reasonable assurance required under 10 CFR 50.476.

Executive Order 12657, issued in 1988 and also codified in 44 CFR Part 352, assigned to FEMA the overall coordination and planning responsibilities whenever state or local governments, either individually or collectively, decline or fail to prepare plans that are sufficient to satisfy Nuclear Regulatory Commission licensing requirements or to participate adequately in the preparation, demonstration, testing, exercising, or use of such plans in actual radiological emergencies. Recently, FEMA established a user fee that is charged to utilities for certain site-specific services performed by FEMA under the REP program. During FY 1992-1992, over $4 million was collected through this fee program. In fiscal year 1993, all of the REP program budget will be recovered through user fees.

Exercises of plans for communities with nuclear power plants are regularly conducted (at least biannually). At least four exercises have been conducted and evaluated at all sites except for the two plants that are under construction, and as many as eight exercises have been conducted at some nuclear power plants sites, since the REP Program began.

FEMA also reviews and approves systems that are used to warn the public about a radiological emergency and prompt them to tune-in to an Emergency Broadcast System station or other source to receive official information and instructions from their state and local governments. FEMA receives annual letters of certification from states certifying that periodic requirements, which include the testing of equipment and the conduct of drills and training, have been met. According to FEMA, many recognize, including Congress, that the best prepared communities in the country for emergencies of any type are those located around commercial nuclear power plants. Given the specific criteria for FEMA's REP Program and the reasonable assurance preparedness standard, additional benefits from these plans have been realized, as some communities have used parts of their REP plans, including upgraded warning systems and evacuation procedures. An example of this occurred in an emergency response to an electrical fire with toxic fumes in Nanticoke, Pennsylvania.

Chemical Stockpile Emergency Preparedness Program (CSEPP)

CSEPP Scope. In 1986, the President signed the Defense Authorization Act, which required the Army to destroy its stockpile of unitary chemical agents stored in the continental United States. FEMA entered into a Memorandum of Understanding in 1988 with the Department of the Army to establish the Chemical Stockpile Emergency Preparedness Program (CSEPP). CSEPP, as mandated by Congress, is to provide "maximum protection" to the communities surrounding the Army installations storing the unitary chemical warfare agents, and the capability to respond rapidly to any potential accident.

CSEPP encompasses ten states and 32 counties that surround the eight Army installations storing unitary chemical agents. CSEPP provides resources and technical assistance to these jurisdictions to enhance their emergency response capabilities, by building on the communities' existing emergency management infrastructure. CSEPP guidance and standards have been developed for command and control, Emergency Operating Centers, communications, protective-action decision making, protective actions and responses,

public alert and notification, traffic and access control, public education and information, and evacuee support. Standards currently under development include emergency worker operations, emergency medical services, decontamination, and reentry.

CSEPP Funding. Funding for CSEPP is provided by the Army and administered through FEMA's Comprehensive Cooperative Agreement (CCA) Program. Unlike other federal planning programs, CSEPP is fully funded and contains no requirement for states to provide matching funds. CSEPP plans are annexes to existing All Hazards plans. Enhancements to the emergency management and response infrastructure provided by the CSEPP should also result in improvements to participating jurisdictions' capability to respond to natural disasters and other emergencies unrelated to the chemical stockpile.

CSEPP Organization. The program is administered through the CSEPP Joint Steering Committee, which is co-chaired by the Army and FEMA and includes the Centers for Disease Control (U.S. Public Health Service), the Department of Agriculture, and the Environmental Protection Agency. The states and local jurisdictions participating in the CSEPP designate their representatives to the Joint Steering Committee and its subcommittees, which ensures that their views are represented.

FINDINGS ON FEDERALLY MANDATED STATE/LOCAL CONTINGENCY PLANNING FOR HAZARDOUS MATERIALS

- Initial local planning for hazardous materials emergencies began in the early 1970s, largely by fire departments who were called to respond to such incidents. Since the early 1980's, states have added hazardous materials planning annexes to their All Hazards Plans as a result fo FEMA guidance.

- A key shift in contingency planning occurred in 1986 with the enactment by Congress of the Emergency Planning and Community right to Know Act (EPCRA), also known as SARA Title III. This legislation added several new dimensions to the local and state planning procedures.

  - ▸ First, as a matter of federal law, Local Emergency Planning Committees were required to prepare hazardous materials contingency plans for their areas.

  - ▸ Second, this law required all stakeholders, including responders and planners, at the local level to plan together regarding extremely hazardous substances on Local Emergency Planning Committees established by State Emergency Response Commissions designated by the Governors.

  - ▸ Third, it required facilities to report specific chemicals to Local Emergency Planning Committees, thus giving local planners and responders more detailed information about the hazards they might have to address in an accident situation in their communities.

  - ▸ And, finally, it called for broad community participation in the planning process.

- One of the primary benefits that has emerged from EPCRA is the increased participation by industry with local communities on the Planning Committees in the planning process.

- Two other federal planning requirements affect specific local communities, and local emergency planning structures: requirements under the Radiological Emergency Preparedness Program for off-site contingency planning for communities affected by commercial nuclear power plants; and contingency planning requirements under the Chemical Stockpile Emergency Preparedness Program. Both programs are administered by FEMA, the latter, in conjunction with the Army, the former with the NRC.

- Planning at the local level is key to effective accident response. The efficacy of the planning process and the plans is dependent upon the willingness of the parties with a stake in both the planning and response to coordinate and communicate with one another.

- Each of the various federally prescribed plans for State and local contingency planning have different approaches to federal, state and local review of the plans. Different agencies at various levels of government may review such plans.

FACILITY CONTINGENCY PLANS REQUIRED BY FEDERAL STATUTES OR REGULATIONS

A number of different statutes require various constituents in the regulated community to develop and, in some cases, report contingency plans for hazardous materials. Because these statutes were enacted independently of one another, similar as well as different components to contingency planning requirements have been regulated. Also, because different statutes identify different, though sometimes similar hazards, the number and type of facilities required to develop contingency plans varies. Following are discussions of Facility Contingency Planning requirements resulting from federal statutes and their implementing regulations.

Resource Conservation and Recovery Act (RCRA) Facility Contingency Planning. Treatment, storage and disposal facilities defined by RCRA, as well as generators of hazardous wastes who accumulate such wastes, are required by regulation to develop contingency plans. Such plans must include: (1) special equipment, including communication/alerting systems in the event of an emergency, fire and spill control equipment, decontamination equipment, and some means of alerting local response authorities; (2) regular testing and maintenance of equipment; and, (3) coordination with local fire, police and hospitals. EPA has allowed facilities that have Spill Prevention Control and Countermeasures Plans, discussed below, to use such plans as RCRA contingency plans. In addition, treatment, storage, and disposal facilities must demonstrate that they have a means of paying for liability to third parties, closure of the facility, post-closure monitoring, and clean up of known releases. The RCRA contingency planning requirements apply to approximately 20,000 facilities nationwide.

Oil Pollution Act (OPA) Tank Vessel and Facility Contingency Planning. The 1990 Oil Pollution Act contained provisions for Tank Vessel and Facility Contingency Planning. Specifically, the law requires tank vessels, off-shore, and certain on-shore facilities to develop contingency plans consistent with the National Contingency Plan and Area Contingency Plans. Such plans must: identify the qualified individual with full authority to implement removal actions, and require immediate communications between that individual and the appropriate federal official and persons providing personnel and resources; identify and ensure by contract or other means, previously approved, the availability of private personnel and equipment, to the extent practicable, necessary to remove, mitigate or prevent a substantial threat of discharge or a worst case discharge; and, describe the training, equipment testing, drills and response actions of persons on the vessel or facility to be carried out by the plan. The Act also mandates submission and approval of the plan as a stipulation of business operations for all vessels and off-shore facilities and certain on-shore facilities.

A Notice of Proposed Rulemaking was published by the Coast Guard in the Federal Register for vessel response plans in June, 1992. These response plans are statutorily required to be in place by 18 February 1993.

Spill Prevention Control and Countermeasures Contingency Planning, (SPCC). The SPCC program, authorized by the Clean Water Act section 311, and administered by EPA, establishes procedures, methods, equipment, and other requirements to prevent discharges of oil to navigable waters from on-shore non transportation-related facilities and to contain such discharges. Authority under the CWA to promulgate similar prevention regulations for vessels has been delegated to the U.S. Coast Guard.

Developed in 1971, the SPCC program is one of the oldest environmental programs administered by EPA to prevent pollution. The regulations affect nearly 500,000 facilities that must develop SPCC plans for aboveground and underground oil storage tanks. The SPCC program is federally administered and has no

provision for delegation to the states. Following the collapse of a four-million gallon aboveground storage tank at a Pennsylvania Ashland Oil facility in 1988, EPA proposed to strengthen the SPCC regulations. Revisions to the SPCC Program are pending.

Clean Air Act, as amended, Facility Contingency Planning Requirements. Facility contingency plans are also required under regulations developed pursuant to the Clean Air Act (CAA) section 112(r) which was added by the Clean Air Act Amendments of 1990. Specifically this section required EPA to adopt "reasonable regulations and appropriate guidance" to provide for the prevention and detection of certain accidental releases of listed chemicals and for response to such releases. The requirements are intended to address the use, operation, repair, replacement, and maintenance of equipment to monitor, detect, inspect, and control accidental releases, including the training of persons in the use and maintenance of equipment and in the conduct of periodic inspections. The regulations are also intended to include procedures and measures for emergency response after an accidental release. In responding to this charge, EPA is developing a regulation which requires affected facilities ("stationary sources") to develop and implement a risk management program, that includes the Risk Management Plan itself, among other features, and an emergency response program.

Also included in Section 304 of the Clean Air Act Amendments of 1990, codified at P.L. 101-549, was language requiring that a comprehensive chemical process safety system be established through rulemaking, including the establishment of "a system to respond to the workplace hazard assessment findings, which shall address prevention, mitigation and emergency responses." OSHA had begun development of such a rule prior to the passage of the Clean Air Act Amendments. The Process Safety Management standard became effective on May 26, 1992. The rule covers more than three million U.S. workers and is expected to significantly reduce the risk of catastrophic fire and explosion.

More than 130 specific toxic and reactive chemicals in specified quantities and flammable liquids and gases in quantities of 10,000 pounds or more are currently covered by the rule. It also applies to pyrotechnics and explosives manufacturers covered under other OSHA rules. The standard includes a non-mandatory appendix which provides detailed guidance to help small business owners and others comply with the standard. The rule requires a process hazard analysis, which includes systematic review of what could go wrong and what safeguards must be implemented to prevent release of hazardous chemicals.

Investigation of incidents involving releases or near misses of covered chemicals; emergency action plans (including required procedures for handling small releases); compliance audits at least every three years and employee training are among the requirements of the standard. OSHA also referenced in the rule standard emergency response requirements contained in OSHA regulations for all industry.

HAZWOPER Plans. In OSHA's Hazardous Waste Operations and Emergency Response Standard, all employers who might encounter an emergency involving a hazardous substance release must develop a Response Plan. Those employers who evacuate employees when an emergency occurs and do not permit employees to assist in handling the emergency, are exempt from this requirement if they develop an Emergency Action Plan, which covers the entire planning for an emergency and all employees. An Emergency Response Plan is concerned with the emergency itself and with those employees directly involved in the efforts to respond and recover from it.

Emergency Action Plans deal with escape and operating procedures in an emergency; accounting for employees in advance; rescue and medical duties; reporting; contacting; and alarm systems. Emergency Response Plans deal much more with recognizing emergencies; safe distances; site control, decontamination; medical care; alert and response procedures; equipment; and the like. Both plans depend heavily on training, and since the HAZWOPER Standard has both performance elements and specific requirements, each employer whose situation is different can pattern this training to his facility situation and has the flexibility of developing unique emergency and action plans.

Atomic Energy Act (ATA) Licensee Contingency Planning Requirements. The Atomic Energy Act, as amended, requires emergency plans for commercial nuclear power plants. These plans have been

discussed previously in this chapter under State and Local Radiological Emergency Planning and Preparedness.

Department of Energy Emergency Management System (EMS). A number of DOE Orders specifically implement the general emergency management concepts of the EMS. These orders are detailed in Appendix 3-A. The DOE Order which establishes the EMS, provides the framework for: (1) developing, coordinating, exercising, testing, and validating emergency plans and procedures; (2) ensuring the readiness of all DOE emergency response capabilities; and (3) managing, coordinating, and directing responses to emergencies. In general, this order sets forth DOE's policy for ensuring that the EMS is capable of responding to and mitigating the consequences resulting from emergencies by:

- Operating facilities and conducting operations in a responsible manner;
- Developing and maintaining emergency planning, preparedness, and response capabilities, as well as effective public and interagency communications;
- Identifying emergency events, making appropriate notifications, and responding to emergencies in an effective and timely manner; and
- Establishing and maintaining readiness assurance through development of Emergency Readiness Assurance Plans and Appraisal Programs (discussed below).

In addition, this DOE Order requires compliance with the provisions of applicable legislation, implementing regulations, Executive Orders, and other federal plans described above.

Under the EMS, planning covers the development and preparation of emergency plans and procedures and the identification of necessary personnel and resources to provide an effective response. Preparedness includes the training of personnel, acquisition and maintenance of resources, and exercising of the plans, procedures, personnel, and resources essential for emergency response.

Another DOE Order implements the planning element of the EMS. Specifically, this Order requires that each DOE Field Element and DOE facility establish an Emergency Readiness Assurance Program to ensure that all portions of the EMS allow for the prompt, efficient, and effective response to any emergency involving DOE facilities or operations. This requirement is fulfilled by the development of Emergency Readiness Assurance Plans and Appraisal Programs.

An additional DOE Order establishes specific requirements for developing emergency management programs at DOE facilities to ensure adequate planning and preparedness capabilities. This Order specifically addresses operational emergencies at the facility level.[3] Each facility must develop an emergency management program containing detailed information and specific instructions for emergency response personnel to implement the emergency plan. In addition, each emergency management program is required to include the following program elements: Emergency Response Organization; Off-site Response Interfaces; Operational Emergency Event Classes; Notification; Consequence Assessment; Protective Actions; Medical Support; Recovery and Reentry; Public Information; Emergency Facilities and Equipment; Training; Drills and Exercises; and Program Administration.

The contents of emergency management programs developed for the various types of DOE facilities vary according to the different hazards and consequences associated with a particular facility. Emergency planning and preparedness programs cover all DOE facilities, not just reactor and non-reactor nuclear facilities. The hazards and potential consequences specific to a particular facility are determined by a hazard

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[3] Other DOE Orders establish emergency management policies and requirements for the energy and continuity of government emergencies, respectively.

assessment. Each facility's hazard assessment considers the broad range of emergency events that could affect the facility and provides the basis for the emergency management program.

CONTINGENCY PLANNING FINDINGS

Facility Contingency Plan Consolidation

Federal statutes and regulations require different segments of the regulated community to prepare a variety of contingency plans. Because these statutes and regulations were enacted independently of one another, similar as well as different, and potentially inconsistent components of these requirements have been regulated. Some planning requirements are more stringent than others; some require specific technical features; and some require submission of the contingency plans for federal or State and local review. Also, because different statutes identify different, though often similar hazards, the number and type of facilities required to develop these plans varies. There is seldom harmony of definitions, hazardous materials covered, facilities covered, or the required formats or elements of particular plans. Consideration should be given to streamlining and consolidating the different federal requirements for facility contingency planning by establishing a federal baseline standard to which additional, and necessary component features could be added in order to address the safety concerns of a particular constituency. Such action will necessitate a more detailed analysis of the reasons for and criteria governing the multiple regulations currently in place, prior to any changes in statutory or regulatory provisions.

Coordination of Contingency Planning across Federal, State and Local Government Agencies

The potential consequences to public safety and the environment of a severe hazardous materials accident, and the complexity of the existing contingency planning systems necessitate close and continued coordination across agencies and among all levels of government. The absence of a consistent and sustained strategy and effective forum for coordinating plans and communication among federal, state and local contingency planning and response groups, could well result in confusion, delays, and problems among responsible parties if any major accident were to occur. While no serious hazardous materials events resulted from the recent Hurricane Andrew, among the lessons learned cited in previous hazardous materials accident reports (Exxon Valdez for example), has been the need for improved coordination among federal, state and local groups. Adding new plans, and planning bodies to the existing complex system has been the approach taken to address coordination issues resulting from previous events or circumstances. However, a solid strategy, based on human interaction among planning and response groups, in addition to exchanging written documents, is a necessity, which laws alone cannot achieve.

To address this concern, the National Response Team within the Executive Branch will develop a consistent strategy for coordination among federal, state and local planning and response groups. Such a strategy will focus on ways to bring such groups together to discuss common problems, and review and explore approaches to planning and response. As part of this effort the NRT, working through and with the RRTs and Area Committees will develop a strategy for establishing liaisons with governors of each state, mayors, and other chief executives of local government. This is to strengthen relationships among federal, state and local response agencies.

Appendix 5-A
Authorities Used by Participating Agencies in the Federal Radiological Emergency Response Plan

A. Department of Agriculture Specific Authorities
Title 7, U.S.C.

B. Department of Commerce Specific Authorities
Department of Commerce Organization Order 25-5B, as amended, June 18, 1987.

C. Department of Defense Specific Authorities

(1) The Atomic Energy Act of 1954, as amended.
(2) Public Law 97-351 "Convention on the Physical Protection of Nuclear Material Implementation Act of 1982."
(3) Department of Defense, Department of Energy, Federal Emergency Management Agency Memorandum of Agreement of Response to Nuclear Weapon Accidents and Nuclear Weapon Significant Incidents. 1983

D. Department of Energy Specific Authorities

(1) Atomic Energy Act of 1954 as amended.
(2) Energy Reorganization Act of 1974 (Public Law 93-438).
(3) Department of Energy Organization Act of 1977 (Public Law 95-91).
(4) Nuclear Waste Policy Act of 1982 (Public Law 97-425).
(5) Department of Defense, Department of Energy, Federal Emergency Management Agency Memorandum of Agreement of Response to Nuclear Weapon Accidents and Nuclear Weapon Significant Incidents. 1983

E. Department of Health and Human Services Specific Authorities

(1) Older Americans Act.
(2) Public Health Service Act.
(3) Food, Drug, and Cosmetic Act of 1938.
(4) Snyder Act, 25 U.S.C. 13 (1921).
(5) Transfer Act, (Public Law 83-568).
(6) Indian Health Care and Improvement Act, (Public Law 14-437).
(7) Federal Civil Defense Act of 1950.
(8) Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended) - Section 413, Crisis Counseling, Administration, Training.
(9) Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (SUPERFUND) (Public Law 96-510) as amended by the SUPERFUND Amendments and Reauthorization Act of 1986 (Public Law 99-499) (1986)

F. Department of Housing and Urban Development Specific Authorities
None.

G. Department of the Interior Specific Authorities

(1) Organic Act of 1879 providing for "surveys, investigations, and research covering the topography, geology, hydrology, and the mineral and water resources of the United States." (43 U.S.C. 31) (U.S. Geological Survey (USGS)).

(2) Appropriations Act of 1894 providing for gaging streams and assessment of water supplies of the U.S. (28 Stat. 398) (USGS).

(3) OMB Circular A-67 (1964) giving DOI (USGS) responsibility "...forthe design and operation of the national network for acquiring data on the quantity and quality of surface ground waters ..."(USGS).

(4) The Reclamation Act of 1902, as amended (43 U.S.C. 391), and project authorization acts (Bureau of Reclamation).

(5) National Park Service Act of 1916 (16 U.S.C. 1 et seq) and park enabling acts (National Park Service).

(6) The Snyder Act of 1921, as amended (25 U.S.C. 13) DOI shall direct, supervise and expend such monies appropriated by Congress for ...the benefit, care and assistance of Indians throughout the United States for such purposes as the relief of distress, and conservation of health, for improvement of operation and maintenance of existing Indian irrigation and water supply systems ...etc. (Bureau of Indian Affairs).

(7) National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd), and refuge enabling acts (Fish and Wildlife Service (FWS)).

(8) Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.) (Bureau of Land Management).

(9) Endangered Species Act (1973) Federal agencies may not jeopardize the continued existence of endangered or threatened species (FWS).

(10) Migratory Bird Treaty Act (1918) Prohibits the taking of migratory birds without permits (FWS).

(11) Anadromous Fish Conservation Act Reestablishes anadromous fish habitat (FWS).

(12) Marine Mammal Protection Act (1972) Conserves marine mammals with management of certain species vested in DOI (FWS).

H. Department of Justice Specific Authorities

(1) Title 42, U.S.C., Section 2011-2284 (Atomic Energy Act of 1954, as amended).

(2) Title 18, U.S.C., Section 831 (Prohibited Transactions Involving Nuclear Materials).

I. Department of State Specific Authorities

(1) Presidential Directive/NSC - 27 (PD-27) of January 19, 1978.

(2) 22 U.S.C. 2656

(3) 22 U.S.C. 2671(a)(92)(A)

J. Department of Transportation Specific Authorities

(1) 49 U.S.C. section 301

(2) Code of Federal Regulations, 44 Part 351, Radiological Emergency Planning and Preparedness Final Regulations, #351.25, the Department of Transportation.

(3) The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

(4) Executive Order 12241, Development and Promulgation of a National Contingency Plan for Radiological Emergencies, September 1980.

(5) Commercial Space Launch Act (Public Law 98-575).

K. Department of Veterans Affairs Specific Authorities

(1) Federal Civil Defense Act of 1950, as amended.

(2) National Security Decision Directive Number 47 (NSDD-47), July 22, 1982, Emergency Mobilization Preparedness.
(3) National Security Decision Directive Number 97 (NSDD-97), June 13, 1982, National Security Telecommunications Policy.
(4) National Plan of Action for Emergency Mobilization Preparedness.
(5) Federal Preparedness Circulars issued by FEMA.
(6) Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended, November 23, 1988.
(7) Veterans Administration and Department of Defense Health Resources Sharing and Emergency Operations Act, Public Law 97-174, May 4, 1982.
(8) Executive Order 11490, Assignment of Preparedness Functions to Federal Departments and Agencies, October 28, 1969, as amended.
(9) National Plan for Federal Response to a Catastrophic Earthquake, March 30, 1989.
(10) Executive Order 12657, Federal Emergency Management Agency Assistance, Emergency Preparedness Planning at Commercial Nuclear Power Plants, November 23, 1988.

L. Environmental Protection Agency Specific Authorities

(1) Atomic Energy Act of 1954, as amended 42 U.S.C. 2011 et seq. (1970), and Reorganization Plan #3 of 1970.
(2) Public Health Service Act, as amended, 42 U.S.C. 241 et seq. (1970).
(3) Safe Drinking Water Act, 42 U.S.C. 300f et seq. (1974).
(4) Clean Air Act, as amended, 42 U.S.C. 7401 et seq. (1977).
(5) Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (SUPERFUND) (Public Law 96-510) as amended by the Superfund Amendments and Reauthorization Act of 1986 (Public Law 99-499) (1986).

M. Federal Emergency Management Agency Specific Authorities

(1) Executive Order 12148, July 20, 1979.
(2) Executive Order 12241, September 29, 1980.
(3) Executive Order 12474, April 3, 1984.
(4) Executive Order 12656, November 18, 1988, 44 CFR Part 350.
(5) Executive Order 12657, November 18, 1988.
(6) 44 CFR 351, Radiological Emergency Planning and Preparedness (March 11, 1982).
(7) 44 CFR 352, Commercial Nuclear Power Plants: Emergency Preparedness Planning (August 2, 1989).
(8) Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended, November 23, 1988.

N. General Services Administration Specific Authorities

(1) The Federal Property and Administrative Services Act of 1947, as amended, 40 U.S.C., 471 et seq.
(2) The Communications Act of 1934, 47 U.S.C. 390 et seq.
(3) The Defense Production Act of 1950, as amended, 50 APP., 2061 et seq.
(4) Executive Order 12472, Assignment of National Security and Emergency Preparedness Telecommunications Functions, April 3, 1984.

(5) Federal Acquisition Regulations, 48 CFR 1.
(6) The General Services Administration Acquisition Regulations.

O. National Aeronautics and Space Administration Specific Authorities

(1) National Aeronautics and Space Act of 1958, as amended.
(2) NHB 1700.1(V1-A) Basic Safety Manual.
(3) NMI 1800.3,NASA Environmental Health Program.

P. National Communications System Specific Authorities

(1) Executive Order 12472, Assignment of National Security and Emergency Preparedness Telecommunications Functions, April 3, 1984.
(2) Executive Order 11490, October 30, 1969.
(3) Executive Order 12046, March 27, 1978.
(4) White House Memorandum, National Security and Emergency Preparedness: Telecommunications and Management and Coordination Responsibilities, July 5, 1978.

Q. Nuclear Regulatory Commission Specific Authorities

(1) Atomic Energy Act of 1954, as amended.
(2) Energy Reorganization Act of 1974.
(3) 10 CFR Parts 0 to 199.

CHAPTER 6. EMERGENCY RESPONSE

INTRODUCTION

Throughout this report the hazardous materials safety system has been discussed primarily from the federal perspective, in keeping with the legislated charge for this report. In the discussion of emergency response, the role of industry, and the role of local and state government agencies must be emphasized, because the majority of incidents or accidents involving hazardous materials are handled by the responsible party or by local and state response authorities. With the exception of response to accidents occurring in navigable waters which are a federal responsibility, the thrust of federal responsibility is to ensure that responsible party and/or state and local response efforts are protective of public health, welfare and the environment and to respond to those incidents which exceed local and state capabilities.

While the federal government is not typically involved in the large numbers of routine hazardous materials accidents which frequently occur, coordination and response by the federal government to low probability, high consequence events is a necessary function. The federal role in hazardous materials emergency response has been directed toward:

- Assisting state and local governments, when necessary, to ensure that response actions are protective of public health, welfare and the environment;
- Providing necessary expertise and resources when the magnitude of an accident exceeds the capabilities and resources available locally;
- Ensuring that responsible parties are held accountable for conducting appropriate cleanup actions and/or reimbursing the Federal government for cleanup costs.[1]

Figure 6-1 displays the various steps in emergency response from initiation of the notification to local authorities to final action, if the accident requires a federal response.

FEDERAL RESPONSE

The existing system for emergency response to oil and hazardous materials incidents is established by the National Contingency Plan (NCP) which coordinates the response authorities of CERCLA and Section 311 of the Clean Water Act, as amended by the Oil Pollution Act of 1990. The following description of federal response gives some indication of the relative roles assumed by various levels of government in emergency response. Data regarding state and local emergency responses to hazardous materials incident notifications were not reviewed for this report.

Approximations for the Number of Federal Responses. As discussed in Chapter 1, in 1991 over 35,000 hazardous materials incident notifications were received at the National Response Center. These included notifications for transportation and fixed facility incidents reported for both the inland and coastal zones. Once a notification is received at the National Response Center, either the Regional EPA or District USCG On-Scene Coordinator (OSC) on duty is notified. If the spill or release is in the coastal zone, the regional Coast Guard OSC is notified. If inland, the EPA OSC in the appropriate region is notified. The OSC then decides if the notification merits federal action.

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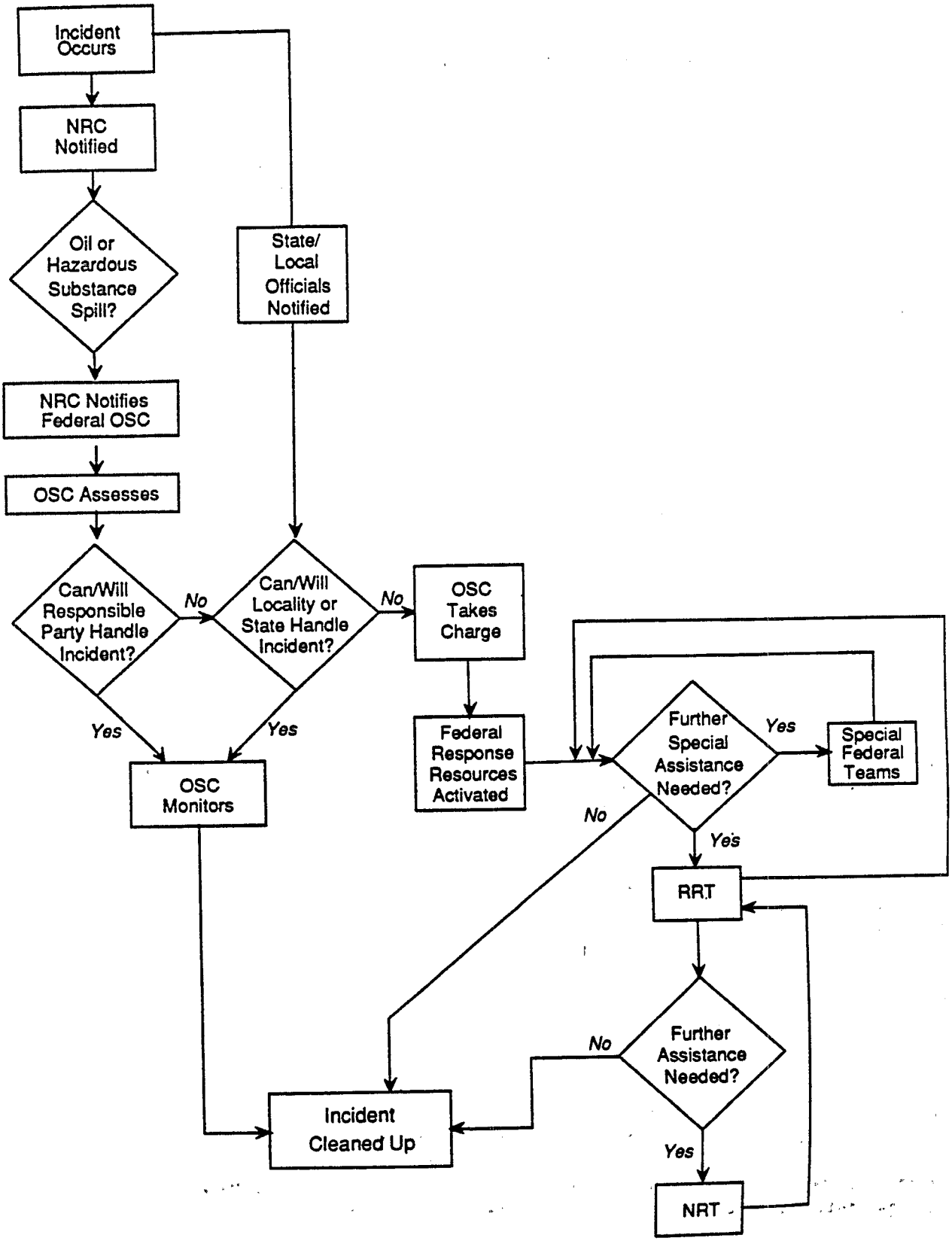
[1] For purposes of this report funding and liability provisions of the various statutes addressed in this report have not been reviewed or described extensively.

Figure 6-1: Incident Response Chart



CERCLA and the NCP define several types of responses to releases of hazardous substances. These include "time-critical" and "non-time critical" removals, and remedial response actions. Time critical removals are defined to include those responses which require initiation of the removal action within six months from the time of notification; non-time critical removals are those responses which are initiated after public comment is received and after six months from the time of notification. Remedial responses generally are for longer term clean-up operations. Historically, most responses generally have been either initiated as time-critical removals or remedial responses. In 1991, EPA regional OSCs initiated approximately 199 time-critical removal actions for hazardous substances incidents (excluding oil) at the requests of the states. These actions required the resources provided under CERCLA in order to adequately protect public health and the environment. Figure 6-2 identifies the numbers of time critical removals which involved an immediate response to an emergency initiated by EPA from 1987 through 1991.[2] Therefore, as shown in the chart, in 1991, there were 199 time critical removals, 54 of which were initiated as emergencies. Additionally, selected on-scene monitoring and oversight are undertaken by EPA for hazardous materials incidents and oil-spill sites being handled by responsible parties or state/local responders.

Figure 6-2: EPA Time Critical Removal Action Starts
Calendar Years 1987 - 1991
Fund Lead

Calendar Year	Emergency	Time-Critical Removals
1987	16	118
1988	21	103
1989	32	151
1990	62	231
1991	54	199
Totals	185	802

Source: CERCLIS, figures include actions responding to hazardous materials notifications, excluding oil.

The USCG, which has primary responsibility for emergencies occurring in the coastal zone, typically receives approximately 8,000 notifications and cleans up approximately 200 oil spills or 2.5%, monitoring an additional 2,000 spills to ensure that responsible parties perform proper clean up.

While these figures for Coast Guard and EPA responses to accidents are approximations, when compared to the vast number of notifications received by the National Response Center, they illustrate the relative roles of the local and state government vs. the federal government for responses to hazardous materials releases and oil spills.

Response personnel are confronted with many decisions at an accident or incident scene. As a result of the planning, reporting, and community right-to-know requirements under EPCRA, local emergency

[2] While the current NCP does not define the term "emergency," earlier proposed revisions to the NCP published in the Federal Register, December 15, 1988, contained EPA's interpretation of the term "emergency." That definition for emergency is "generally referring to those actions where the release requires that response activities begin on-site within hours of the lead agency's determination that a removal action is appropriate." This definition is generally followed for programmatic purposes within EPA.

responders now have access to information about the risks imposed by hazardous materials present in local fixed facilities. Detailed response plans can be developed to address important issues such as:

- Types and quantities of materials processed or stored.
- Location and layout of overall facility.
- List of products stored in the facility together with storage locations.
- Location, type, dimensions, capacity, venting systems, contents, pressure, and temperature of chemical reactors, storage tanks, holding tanks, and other vessels.
- Location, layout, and destination of sewer and drainage systems in the area.
- Fire protection systems in the facility.
- Appropriate personal protective clothing to be worn.
- Appropriate extinguishing agents to be used.
- Personnel and other resources required.
- Pre-designated staging areas for responding personnel and equipment.

Most important, these characteristics associated can be researched and evaluated at length before the event without the stress and potential for error as is commonly present when responding to an incident.

Hazardous material incidents are often confusing and dangerous in their initial stages, especially if responding emergency personnel do not have a good idea of the nature and quantities of the materials that may be involved upon arriving at the incident scene. Evaluations and decisions relating to transportation incidents, especially must be made by responders at the incident scene, often under stressful and often confusing conditions. Decision making becomes a difficult process when confronted with several derailed and burning tank cars, each leaking its load of 20,000 gallons of a highly flammable and toxic material in a heavily populated neighborhood or into a major body of water. Often, the most difficult decision involves the most basic issue of all -- the proper identification of the material or materials present. After making this determination, responders must then be concerned with major issues such as:

- The need to evacuate or establish in-place shelter should the incident be in a populated neighborhood.
- Diversion of vehicle and/or pedestrian traffic.
- The appropriate protective equipment.
- Whether an attempt should be made to patch or plug the leaking container or containers.
- What extinguishing agent is appropriate.
- What additional resources are required.
- Measures to be taken for the protection of the environment such as:

  Preventing land discharges from contaminating groundwater supplies, or flowing into drains and sewers leading to bodies of water;

Containing discharges into bodies of water; and

Preventing and controlling the dispersion of airborne vapors and contaminants.

- Cleaning up and disposing of released materials and contaminated items.
- Personnel and property decontamination.

These are examples of the issues that must be addressed by responders at the scene of a hazardous materials incident. Even then, the decision making surrounding these issues can only be made on the basis of a thorough evaluation of the chemical properties (e.g., vapor pressure, vapor density, flammable range, solubility, boiling point, reactivity, etc.) of the materials involved.

The most significant difference in responding to a fixed facility and a transportation incident involving hazardous materials is the likelihood of dealing with the known as opposed to the unknown. It is a much easier process to direct an effective response when armed with a detailed plan based on a thorough knowledge of the operating environment.

FEDERAL RESPONSE RESOURCES

The U.S. government response capabilities and actions for accidental release incidents are carried out within the context of three existing federal systems: 1) the National Oil and Hazardous Substances Response System, including the National Contingency Plan (NCP); 2) the Federal Radiological Emergency Response Plan (FRERP); and 3) the Federal Response Plan (FRP). Each is discussed in detail in Chapter 5 of this report.

Each of the federal agencies and departments with hazardous materials emergency responsibilities brings a range of resources and capabilities to the response system. Each has an internal organizational structure and coordination system for providing such support. The primary federal interagency coordination mechanism for hazardous materials emergencies, including oil and hazardous materials, is the National Response Team. Following is a description of the types of resources and capabilities available from the fifteen member agencies of the NRT.

EPA ORGANIZATIONAL RESPONSE COMPONENTS AND RESOURCES

EPA has developed an extensive response capability as well as a resource network of policy, scientific, and technical support for oil and hazardous substance incidents. For a chemical/biological threat, EPA provides advice and assistance in any federal preparedness and response activities. In an emergency situation, EPA may activate a number of response teams and committees. Regional activities are coordinated through the affected Region's Regional Response Team. The following are specific response resources or personnel assignments.

The On-Scene Coordinator (OSC) is the federal official, either from regional EPA offices for inland emergencies or from USCG offices of the Captains of the Port for coastal zone emergencies, trained to respond to oil and hazardous substance emergency incidents. Two other Federal agencies, Department of Defense (DOD) and the Department of Energy (DOE), provide an OSC if the emergency is within that agency's jurisdiction. OSCs carry out their responsibilities under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and are responsible for coordinating all federal containment, removal, disposal efforts, and resources during an incident. The OSC is also the point of contact for the coordination of federal efforts with those of the local response community. The OSC has access to extensive federal response resources. The OSC can also be a source of valuable support and information to the local response community.

Scientific Support Coordinators (SSCs) support the OSC as scientific and technical advisors. Their capabilities include contingency planning, surface/subsurface trajectory forecasting/hindcasting, resource risk analysis, technical hazard data assessment, and general communications. The National Oceanic and Atmospheric Administration (NOAA) provides SSCs to the USCG for coastal zone emergencies. The SSCs serve as the principal points of contact for members of the scientific community.

Contract Resources

The Technical Assistance Team (TAT) contracts provide EPA with technical assistance in support of the Agency's emergency response and spill prevention programs. Specific services provided by TAT to assist in emergency responses and removal actions include:

- sampling and analysis;
- preparation of site safety plans;
- damage assessment;
- cleanup documentation;
- engineering and feasibility studies;
- analytical services; and,
- special projects.

The Emergency Response Cleanup Services (ERCS) contracts provide emergency cleanup services for removal of oil, petroleum, and hazardous materials. The contractors provide the necessary:

- cleanup equipment;
- personnel;
- materials;
- subcontractors; and,
- other resources

to accomplish containment, countermeasures, cleanup, mitigation, restoration, disposal, and alternative technology. Emergency response resources are available anywhere in the United States at all times on 2-to-24 hours notice, depending on location.

Other Specialized Response Resources

The Environmental Response Team (ERT) was established by EPA to support its environmental responsibilities. The ERT, based in Edison, New Jersey, includes technical emergency response experts in biology, chemistry, hydrology, geology, and engineering. Twenty-three technical personnel on the ERT and over 100 additional technical personnel are available through ERT's contracts. The Team can provide access to special monitoring and decontamination equipment for chemical releases, and provides advice to the On-Scene Coordinator (OSC) on:

- hazard evaluation;
- risk assessment;
- multimedia sampling and analysis;
- on-site safety, including development and implementation plans;
- cleanup techniques and priorities;
- water supply decontamination and protection;
- application of chemical dispersant;
- environmental assessment;
- degree of cleanup required; and,
- disposal of contaminated material.

In addition, the ERT provides both introductory and intermediate level training courses for local, state and federal government response personnel and the private sector.

EPA Radiological Facilities

EPA has three radiological facilities, each equipped for field and laboratory monitoring assistance during a radiological emergency. Two of these facilities are managed by Office of Radiation Programs, with one located at the National Air and Radiation Environmental Laboratory in Montgomery, Alabama, and the other at the ORP/Las Vegas Facility in Las Vegas, Nevada. The third facility is the Environmental Monitoring Systems Laboratory in Las Vegas, managed by the Office of Research and Development.

Each laboratory has complete analytical capability to measure all alpha and beta-gamma emitting radionuclides anticipated to represent a potential public hazard during an environmental radiological emergency. Some of the analytical equipment from each laboratory can be moved into the field in a mobile laboratory or may be transferred to an established field laboratory. EPA has mobile laboratories for measuring radioactivity in environmental media.

A joint standby Radiological Emergency Response Team (RERT) is organized among headquarter's laboratory personnel consisting of team members and field equipment for sampling and radiologically analyzing air, water, and food, and for making direct alpha, beta, and gamma radiation measurements. Team members are also trained in response to hazardous materials other than radioactivity. Team response time will vary depending on the travel distance, whether the response is ordered during normal working hours, and the magnitude of the response. Personnel monitoring equipment for team members is available at all laboratories.

EPA operates the Environmental Radiation Ambient Monitoring System (ERAMS) for measuring radioactivity or other contaminants in various environmental media. ERAMS has 67 sampling stations throughout the United States and it possesses and collects samples of air, precipitation, drinking water, surface water, and pasteurized milk. Although the principle purpose of ERAMS is to measure ambient levels of radioactivity in the environment, it can also be used to collect samples of other chemical agents.

Laboratories and Other Technical Resources

EPA maintains a number of laboratories to support the Agency's missions including research, monitoring, and sampling/analysis. These labs are under the auspices of several program offices (Office of Research and Development and the Office of Radiation Programs) and, in addition, each EPA regional office has its own laboratories.

Research Laboratories. EPA has thirteen research labs; twelve laboratories are located within the Office of Research and Development (ORD), and one lab is operated by the Office of Radiation Programs. Responsibilities of the research labs include management of programs in field monitoring, analytical support, and other technical support for quality assurance programs relative to air, water, wastewater, and solid waste.

The Transportable Emergency Response Monitoring Module is an air, rail, and truck transportable laboratory being developed jointly by EPA, the Department of State, Department of Defense, and other departments and agencies. It is capable of being placed in hostile and hazardous environments to monitor chemical, biological, and nuclear agents in air, water, ground water, hazardous waste.

In addition to its labs to help emergency planners and first responders plan for and safely handle chemical accidents, the Computer-Aided Management of Emergency Operations (CAMEO) is a software package developed by the EPA and the National Oceanic and Atmospheric Administration. CAMEO provides rapid and easy access to data supporting emergency response and technical recommendations for response actions. The package contains response information for over 4000 common chemicals, an air dispersion model, and several databases to assist with planning. CAMEO can link related data and graphics; for example, users may design custom overlays to display facilities and chemical information, evacuation zones, special populations, and hazards analysis vulnerability zones on local maps. It is used by state and local government agencies for planning and response.

U.S. COAST GUARD RESPONSE CAPABILITY

Section 311 of the Federal Water Pollution Control Act (FWPCA), as amended by the 1990 Oil Pollution Act and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), are the principal authorities for federal response to discharges of hazardous substances. The procedures and standards for conducting responses are contained in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Each Coast Guard Captain of the Port (COTP), under the NCP and applicable Regional and Area Contingency Plans, coordinates federal activities on scene as either the predesignated On-Scene Coordinator (OSC) or the first federal official in the absence of the predesignated OSC.

In all incidents within the geographic zone of responsibility, the Coast Guard OSC is the lead official directing or monitoring the response on scene. While the federal government is either removing or monitoring the removal or discharge, the OSC manages and has final decision on all actions over Coast Guard resources and those of other federal, state and local responders engaged in the response.

Coast Guard policy ensures that timely and effective response action is taken to control and remove discharges of oil and releases of hazardous substances, including substantial threats of discharges and releases, into the coastal zone, unless such removal actions are being conducted properly by the responsible party.

The Coast Guard OSC has a number of operational and administrative assets to support pollution response efforts. Some of these resources come from within the Coast Guard, other specialized personnel and resource support comes from other supporting commands and bodies within the National Response System.

Each of the 47 Coast Guard OSC's has a complement of pollution response equipment which includes, pollution containment boom and response trailers to carry and deploy the gear throughout their zones of responsibility. Additionally the Coast Guard maintains specialized oil spill response equipment in 19 cities nationwide. These sites were selected based on locale and risk and provide hubs for rapid deployment throughout the region. The placing of additional equipment nationwide allows the Coast Guard to respond more quickly to oil spills in most coastal areas of the United States. The prepositioned equipment at these 19 sites includes skimmers, collapsible oil barges, and oil containment boom footage. Delivery of the gear is beginning in November in 1992.

The Coast Guard has established Special Units and Teams to provide information and resources locally to the OSC during a response effort. These include the National Response Center, National Strike Force Coordination Center, the Atlantic, Gulf and Pacific National Strike Force Teams, the District Response Advisory Teams, the National Pollution Funds Center, the National Response Team, Regional Response Teams, and Area Response Committees.

The National Response Center located at Coast Guard Headquarters is the national communication center, continuously manned for handling activities related to response actions. The Center acts as the single point of contact for all pollution incident reporting, and as the NRT communications center.

The National Strike Force Coordination Center, created by the Oil Pollution Act, assists the OSC by selecting, locating and employing specialized pollution response equipment that would be effective in responding to specific problems at the site; establishing site-specific equipment and manpower requirements to monitor and conduct cleanup operations; establishing the necessary site-specific logistics requirements for the local transportation of equipment into spill areas and receiving and staging areas; and, planning day-to-day response operations after a spill.

The National Strike Force, is comprised of three teams located in New Jersey, Alabama and California. These teams to airlift highly skilled pollution response experts and specialized oil cleanup equipment to the scene of a discharge assist and advise the OSC. National Strike Force personnel are

trained and available to assist the OSC in directing or monitoring cleanup or complete hands-on response operation with their own equipment. They can assist the OSC in managing or coordinating cleanup contractors, industrial responders, civic groups, state and local government responders and media relations. The National Strike Force also maintains and operates an inventory of offshore oil spill and chemical response equipment which includes pollution containment boom, skimming barriers, containment barges, mobile command posts, workboats, various kinds of transfer pumps.

The District Response Advisory Team serves as a coordinating body, and as a readily accessible team of spill professionals who are available to provide technical assistance to the OSC in the event a spill exceeds local response capabilities. The District Response Advisory Teams help ensure that Area Contingency Plans in different areas within the District are compatible and that pre-staged response equipment is available.

The National Pollution Funds Center is an integral part of the response organization, administering the Oil Spill Liability Trust Fund and Coast Guard use of CERCLA funds. It provides: funding to various environmental response organizations for timely abatement and removal activities related to oil spills; provides equitable compensation for claimants who sustain loss and damage from oil pollution when the responsible party fails to do so; ensures funding for incident specific natural resource damage assessment and restoration activities; and, recovers the costs of removal activities or damages from those responsible for oil pollution incidents.

The NRT, RRT and Area Committees are all administrative bodies established to support the OSC during response actions. These bodies conduct planning and coordination for preparedness and response actions undertaken at their various levels.

OTHER KEY FEDERAL ORGANIZATIONAL RESPONSE COMPONENTS AND RESOURCES

The National Response Team (NRT) consists of 13 other federal agencies (discussed below) with interests and expertise in various aspects of emergency response. NRT assistance usually takes the form of technical advice, access to additional resources/equipment, or coordination with the Regional Response Teams. Following is a description of each NRT member agency's responsibilities for a major response requiring federal support. These descriptions are not limited by each agency's role under the NCP, but may include other response roles where appropriate.

The **Department of Agriculture (USDA)** has scientific and technical capabilities to measure, evaluate, and monitor, either on the ground or by use of aircraft, situations where natural resources including soil, water, wildlife, and vegetation have been impacted by fire, insects and diseases, floods, hazardous substances, and other natural or man-caused emergencies. The USDA may be contacted through Forest Service emergency staff officers who are the designated members of the RRT. Agencies within USDA which have relevant capabilities and expertise are as follows:

(i) The Forest Service has responsibility for protection and management of national forests and national grasslands. The Forest Service has personnel, laboratory, and field capability to measure, evaluate, monitor, and control as needed, releases of pesticides and other hazardous substances on lands under its jurisdiction.

(ii) The Agriculture Research Service administers an applied and developmental research program in animal and plant protection and production; the use and improvement of soil, water, and air; the processing, storage, and distribution of farm products; and human nutrition. The ARS has the capabilities to provide regulation of, and evaluation and training for, employees exposed to biological, chemical, radiological, and industrial hazards. In emergency situations, the ARS can identify, control, and abate pollution in the areas of air, soil, wastes, pesticides, radiation, and toxic substances for ARS facilities.

(iii) The Soil Conservation Service has personnel in nearly every county in the nation who are knowledgeable in soil, agronomy, engineering, and biology. These personnel can help to predict the effects of pollutants on soil and their movements over and through soils. Technical specialists can assist in identifying potential hazardous waste sites and provide review and advice on plans for remedial measures.

(iv) The Animal and Plant Health Inspection Service can respond in an emergency to regulate movement of diseased or infected organisms to prevent the spread and contamination of unaffected areas.

(v) The Food Safety and Inspection Service has responsibility to prevent meat and poultry products contaminated with harmful substances from entering human food channels. In emergencies, it works with other federal and state agencies to establish acceptability for slaughter of exposed or potentially exposed animals and their products. In addition they are charged with managing the Federal Radiological Emergency Response Program for the USDA.

The **Department of Commerce (DOC), through NOAA,** provides scientific support for response and contingency planning in coastal and marine areas, including assessments of the hazards that may be involved, predictions of movement and dispersion of oil and hazardous substances through trajectory modeling, and information on the sensitivity of coastal environments to oil and hazardous substances; provides expertise on living marine resources and their habitats, including endangered species, marine mammals and National Marine Sanctuary and Estuarine Research Reserve ecosystems; provides information on actual and predicted meteorological, hydrological, ice, and oceanographic conditions for marine, coastal, and inland waters, and tide and circulation data for coastal and territorial waters and for the Great Lakes.

The **Department of Defense (DOD)** has responsibility to take all action necessary with respect to releases where the release is on, or the sole source of the release is from, any facility or vessel under the jurisdiction, custody, or control of DOD. DOD may also, consistent with its operational requirements and upon request of the OSC, provide locally deployed United States Navy USN oil spill equipment and provide assistance to other federal agencies on request. The following two branches of DOD have particularly relevant expertise:

(i) The **United States Army Corps of Engineers** has specialized equipment and personnel for maintaining navigation channels, for removing navigation obstruction, for accomplishing structural repairs, and for performing maintenance to hydropower electric generating equipment. The Corps can also provide design services, perform construction, and provide contract writing and contract administrative services for other federal agencies.

(ii) The **United States Navy (USN)** is the federal agency most knowledgeable and experienced in ship salvage, shipboard damage control, and diving. The USN has an extensive array of specialized equipment and personnel available for use in these areas as well as specialized containment, collection, and removal equipment specifically designed for salvage-related and open-sea pollution incidents.

The **Department of Energy (DOE)** generally provides designated OSCs that are responsible for taking all response actions with respect to releases where the release is on, or the sole source of the release is from, any facility or vessel under its jurisdiction, custody, or control, including vessels bareboat-chartered and operated. In addition, DOE provides advice and assistance to other OSCs for emergency actions essential for the control of immediate radiological hazards. Incidents that qualify for DOE radiological advice and assistance are those believed to involve source, by-product, or special nuclear material or other ionizing radiation sources, including radium, and other naturally occurring radionuclides, as well as particle accelerators. Assistance is available through direct contact with the appropriate DOE Radiological Assistance Coordinating Office.

DOE has developed a three-tiered organizational approach. Responsibility begins at the facility level, rises through the cognizant DOE Field Element, and culminates in the appropriate HQ Program Office. Each of these organizational elements is responsible for developing integrated and compatible plans and implementing procedures to effectively and efficiently carry out their responsibilities for responding to an emergency situation involving or affecting a DOE facility under their cognizance.

In response to an emergency, Emergency Management Teams are formed at the Facility, Field Element, and DOE Headquarter levels. These teams provide management and direction of emergency response activities. The Headquarter team consists of an Executive Team, which provides strategic direction to a response, and a Technical Operations Cadre, which provides oversight to the Field Element, coordinates with other Federal agencies, and provides information to the press, Congress, and other Federal agencies.

For operational emergencies, the Department maintains several radiological emergency response assets that also can provide assistance to other Federal, state, tribal, and local agencies in responding to all types of radiological incidents. These assets include the following:

- Nuclear Emergency Search Team. A group of experts, assisted by radiation detection systems and associated personnel, responsible for providing assistance in nuclear threat emergencies for the search and identification of any ionizing radiation-producing materials that may have been lost or stolen or associated with bomb threats or radiation dispersal threats.

- Accident Response Group. A group of technical and scientific experts composed of DOE and DOE-contractor personnel responsible for providing assistance to peacetime accidents and significant incidents involving nuclear weapons.

- Radiological Assistance Program. A DOE program that provides for radiological assistance to Federal, state, tribal, and NRC licensees in the event of an incident involving radioactive materials.

- Radiological Assistance Teams. Experienced DOE and DOE-contractor professionals who are adequately equipped to conduct off-site radiological emergency monitoring. These teams are located at all DOE operations offices, national laboratories, and most area offices and associated contractors.

- Aerial Measuring System. An aerial detection system with the capability of measuring extremely low levels of gamma radiation and locating and tracking airborne radiation. The system also has aerial photography and multi-spectral sensing capabilities.

- Federal Radiological Monitoring and Assessment Center. A facility, set up near the scene of a radiological emergency, from which an off-site technical director conducts the Federal Radiological Monitoring and Assessment Plan response as part of the FRERP, and in coordination with participating FRERP agencies. Following the initial phase of the emergency, this facility — as specified by the FRERP — is managed by the EPA Office of Radiation and Indoor Air.

- Radiological Emergency Assistance Center/Training Site. A multipurpose medical facility located in Oak Ridge, TN, prepared to deal with all types of radiation exposure emergencies and prepared to provide medical and health physics advice and assistance in radiological emergencies.

The **Department of Health and Human Services (HHS)** assists with the assessment, preservation, and protection of human health and helps ensure the availability of essential human services. HHS provides technical and nontechnical assistance in the form of advice, guidance, and resources to other federal agencies as well as state and local governments.

The principal HHS role in response involves the U.S. Public Health Service and is coordinated from the Office of the Assistant Secretary for Health, and various Public Health Service regional offices. Within the Public Health Service, the primary function during a response to a hazardous materials emergency is to provide the support of the Agency for Toxic Substances and Disease Registry (ATSDR) and the Centers for Disease Control (CDC). Both ATSDR and CDC have a 24-hour emergency response capability wherein scientific and technical personnel are available to provide technical assistance to the lead federal agency and state and local response agencies on human health threat assessment and analysis, and exposure prevention and mitigation. Such assistance is used for situations requiring evacuation of affected areas, human exposure to hazardous materials, and technical advice on mitigation and prevention. CDC takes the lead during petroleum releases regulated under the Oil Pollution Act while ATSDR takes the lead during chemical releases under CERCLA/SARA. Both agencies are mutually supportive.

Other Public Health Service Agencies involved in support during hazardous materials incidents either directly or through ATSDR/CDC include the Food and Drug Administration, the Health Resources and Services Administration, the Indian Health Service, and the National Institutes of Health.

The National Institutes for Environmental Health Sciences (NIEHS), among other responsibilities, administers grants for training and education of workers who are or may be engaged in activities related to hazardous waste removal, containment, or emergency responses, under the authority of SARA section 126(g).

The **Department of the Interior (DOI)** maintains Regional Environmental Officers who are the designated members of Regional Response Teams. Department land managers have jurisdiction over the national park system, national wildlife refuges and fish hatcheries, public lands, and certain water projects in western states. Because certain lands managed by the DOI have been set aside with special designations denoting more restrictive uses for conservation purposes, i.e., units of the National Park System, National Wildlife Refuges, and Wilderness Areas, these lands and their designations require special consideration and care in the event of an emergency response involving hazardous materials. DOI, as a trustee, provides additional expertise during an emergency in the following areas:

(i) Fish and Wildlife Service: Anadromous and certain other fishes and wildlife, including endangered and threatened species, migratory birds, and certain marine mammals; waters and wetlands; contaminants affecting habitat resources; and laboratory research facilities.

(ii) Geological Survey: Geology, hydrology (ground water and surface water), and natural hazards.

(iii) Bureau of Land Management: Minerals, soils, vegetation, wildlife, habitat, archaeology, and wilderness management; wildfire suppression, "all risk" command and control systems, and emergency response logistics; and hazardous materials management and response.

(iv) Minerals Management Service: Manned facilities for Outer Continental Shelf oversight; oversight of offshore oil and gas production facilities and associated pipelines and pipeline facilities under the Outer Continental Shelf Lands Act and the Clean Water Act.

(v) Bureau of Mines: Analysis and identification of inorganic hazardous substances and technical expertise in metals and metallurgy relevant to site cleanup.

(vi) Office of Surface Mining: Coal mine wastes and land reclamation.

(vii) National Park Service: Biological and general natural resources expert personnel at park units; general biological, natural, and cultural resource managers to evaluate, measure, monitor, and contain, threats to park system lands and resources; archaeological and historical expertise in protection, preservation, evaluation, impact mitigation, and restoration of cultural resources; emergency personnel.

(viii) Bureau of Reclamation: Operation and maintenance of water projects in the West; engineering and hydrology; and reservoirs.

(ix) Bureau of Indian Affairs: Coordination of activities affecting Indian lands; assistance in identifying Indian tribal government officials.

(x) Office of Territorial Affairs: Assistance in implementing the NCP in American Samoa, Guam, the Pacific Island Governments, the Northern Mariana Islands, and the Virgin Islands.

The **Department of Justice (DOJ)** provides expert advice on complicated legal questions arising from discharges or releases, and federal agency responses. In addition, the DOJ represents the federal government, including its agencies, in litigation relating to such discharges or releases of hazardous materials.

The **Department of Labor (DOL), through the Occupational Safety and Health Administration (OSHA)** and the state OSHA operating plans conducts safety and health inspections of hazardous waste sites, including emergency locations, to assure that employees are being protected and to determine if the site is in compliance with federal regulations and conducts investigations of accidents involving worker casualties.

In OSHA's Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120),all employers involved in hazardous substance emergencies and related activities must develop a Response Plan. Those employers who evacuate employees when an emergency occurs and do not permit employees to assist in handling the emergency are exempt from this requirement if they develop an Emergency Action Plan, which covers the entire planning for an emergency and all employees. An Emergency Response Plan is concerned with the emergency and with those employees directly involved in the efforts to respond to and recover from the emergency.

Emergency Action Plans deal with escape and operating procedures in an emergency, accounting for employees in advance, accounting for employees in advance, rescue and medical duties, reporting, contacting, and alarm systems. Emergency Response Plans deal much more with recognizing emergencies, safe distances, site control, decontamination, medical care, alert and response procedures, equipment, and the like. Both plans depend heavily on training, and since the HAZWOPER Standard has both performance elements and specific requirements, each employer whose situation is different can pattern this training to his facility situation and has the flexibility of developing unique emergency and action plans.

In OSHA's Process Safety Management of Highly Hazardous Chemicals Standard, employers who have substances with catastrophic potential must establish and implement an emergency action plan for their entire plant. The plan must also include procedures for handling small releases.

The **Department of State (DOS)** calls on EPA and the Coast Guard, as well as other support agencies when assistance is needed to coordinate an international response, or when discharges or releases cross international boundaries or involve foreign flag vessels. Additionally, DOS will coordinate requests for assistance from foreign governments and U.S. proposals for conducting research at incidents that occur in waters of other countries.

The **Department of Transportation (DOT)** provides response expertise pertaining to transportation of oil or hazardous substances by all modes of transportation. In addition with the 1990 enactment of the Hazardous Materials Transportation Uniform Safety Act, DOT, in coordination with other federal agencies is administering a major federal initiative to train first responders to accidents involving hazardous materials.

Federal Emergency Management Agency (FEMA). In anticipation of, or in response to, an event requiring Federal disaster assistance, FEMA will activate a Regional Operations Center at the appropriate Regional Office and dispatch an Emergency Response Team to the scene to assess damage and coordinate requirements for assistance under the Stafford Act. An interagency Emergency Support Team will be established at Headquarters to monitor activity and provide support to the field, as required.

Under a Presidential major disaster or emergency declaration, FEMA appoints a Federal Coordinating Officer to coordinate overall requirements for Federal disaster assistance. The FCO will use the structures of the Federal Response Plan (FRP) to coordinate response and recovery assistance programs of departments and agencies, including the provision of direct Federal assistance, and assistance to individuals, businesses, and public entities.

In response to a radiological incident, FEMA will coordinate its off-site response activities under the Federal Radiological Emergency Response Plan (FRERP) using the structures of the FRP.

FEMA also operates two resident training institutions which provide training in hazardous materials preparedness and response. These are the Emergency Management Institute and the National Fire Academy, both co-located in the National Emergency Training Center in Emmitsburg, Maryland. Each offers courses addressing the full spectrum of emergency management topics, including preparedness, response, recovery, and mitigation for a wide range of disasters, including hazardous materials incidents. Typically students are local and state officials responsible for planning and emergency response to hazardous materials, natural and technological risks.

The **General Services Administration (GSA)** provides emergency logistical and telecommunications services to federal agencies. The support provided includes leasing and furnishing office space, ordering telecommunications services, arranging transportation services, and purchasing or leasing equipment, materials, supplies, and services. Additionally, GSA can support state and local emergency activities if the assisted federal agency has the authority to aid those jurisdictions. Because the GSA support activities are not covered by appropriated funds, the supported federal agency must reimburse GSA for its services.

The **Nuclear Regulatory Commission** will respond, as appropriate, to releases of radioactive materials by its licensees, in accordance with the Nuclear Regulatory Commission Incident Response Plan and it will monitor the actions of those licensees to ensure that the public health and environment are protected and adequate recovery operations are instituted. The Nuclear Regulatory Commission informs EPA of any significant actual or potential releases in accordance with procedural agreements. In addition, the Nuclear Regulatory Commission will provide advice to the OSC when assistance is required in identifying the source and character of other hazardous substance releases where the Nuclear Regulatory Commission has licensing authority for activities utilizing radioactive materials.

National Response Center. The National Response Center acts as the 24-hour report processing and response coordination center for environmental emergency threats. The National Response Center provides a single, continuously staffed operations center (operated by the US Coast Guard) that receives and refers for action and/or investigation, all reports from all sectors (i.e., industry, government, general public) of environmental, etiological, and biological incidents throughout the United States, Puerto Rico, the Virgin Islands, and Guam. The Center would be contacted in the event of the following incidents:

- a hazardous chemical release;
- a release of etiological or hazardous biological material;
- an oil spill;
- a pipeline accident;
- a transportation accident involving hazardous materials or oil;
- a release of radioactive material;
- a catastrophic earthquake or other natural disaster; or
- a potential emergency involving any of the above.

The National Response Center receives reports through either its toll free number (800-424-8802), or its commercial number (202-267-2675). Reports are immediately relayed to the appropriate federal On-Scene Coordinator and other designated personnel for action. Calls to the National Response Center activate the national response system described in this document.

CHAPTER 7. CONCLUSION

INTRODUCTION

This review presents a description of the existing system of federal laws, regulations, and responsibilities of the multiple federal agencies for hazardous materials accident prevention, preparedness, and response. The system, for the most part, has met its statutory goals. However, the proliferation of statutes and regulations has resulted in a complex hazardous materials safety system, confusion, and overlap in programs, regulations, and laws which warrant change.

In response to the statutory charge, the review presents the federal perspective on the issues identified and examines the federal role in accident prevention, prevention, preparedness, and response. The review highlights areas needing additional research and discussion for improving hazardous materials safety. The particular perspective requested for this review focused only on federal authorities and responsibilities. Because of this, substantial limitations exist in the scope and depth of the review, particularly with respect to the activities, provisions, and roles of the regulated industries, and the state and local governments in accident prevention, preparedness, and response.

THE NEED FOR STAKEHOLDER PARTICIPATION

The concerns identified in this review greatly impact the regulated industries, local and state implementing agencies, contingency planners and responders, and other groups. The chemicals and other hazardous materials discussed affect the daily lives of all citizens through the conveniences and benefits they provide, as well as through the risks inherent in their design, production, storage, use, transportation, and disposal.

A significant body of laws and regulations have been implemented to fulfill the governments' responsibility to protect the public and the environment. In describing the existing federal system for hazardous materials accident prevention, preparedness, and response, six primary findings were identified. Each of these findings, and the solutions to the concerns raised by these findings, affect the stakeholders in the regulated communities, regulators, as well as the state and local government agencies with federally mandated responsibilities for accident prevention, preparedness, and response.

- The statutory and regulatory terminology used to define hazardous materials and reportable events for accident-related purposes varies widely among the laws and regulations, and leads to confusion among the regulated community. Development of more uniform terminology for regulated substances and reportable events is necessary to eliminate such confusion.

- Accident reporting requirements burden unnecessarily the whole accident response system including regulated industry, regulators, and responders. The resulting data management systems fail to provide adequate information on which future policies can be determined.

- Multiple hazard classification systems result in a lack of national and international harmonization among agencies regulating such materials. These differing systems create adverse impacts for U.S. accident prevention, preparedness, and response by burdening compliance actions by the regulated community, and enforcement and program implementation actions on the part of regulators. In addition, this lack of national harmonization due to disparate systems may burden international trade and prevent the U.S. from taking a leadership role in moving toward international harmonization goals.

- Unlike accident preparedness and response, a forum for information-sharing among federal agencies with accident prevention regulatory responsibilities has not existed. Differing

agency requirements, multiple planning and regulatory bodies, and variety within the regulated community make such coordination imperative, but difficult.

- Coordination between and among the multiple federal, state, and local planning bodies and response mechanisms is inadequate and creates unnecessary intergovernmental burdens. The numerous federal, state, and local plans and planning bodies have created an unprecedented need among and between these planning bodies. Unless such planning bodies effectively coordinate their efforts, the potential for less than adequate outcomes during a major accident remains high.

- Federal requirements for facility contingency planning are duplicative and need to be rationalized or consolidated. The same members of the regulated community may in many instances be required to develop a number of contingency plans to comply with multiple agencies' requirements covering similar substances to address similar prevention, preparedness, and response concerns.

EXECUTIVE AGENCY ACTIONS

Based on this report, the Executive Branch is undertaking several actions to address the findings in order to improve its coordination responsibilities.

As a result of the work of the National Response Team on this report and the recent NRT report "Federal Government Control of Hazardous Materials," the NRT has established a Prevention Committee to foster a dialogue among its members on matters regarding development and promulgation of hazardous materials and oil spills prevention programs at the federal level. The objectives of this Committee are to: (1) Provide and facilitate communication and information exchange regarding prevention activities; (2) Maintain awareness of interagency or federal hazardous materials and oil spill prevention activities; and (3) Promote the coordination of prevention activities among the federal agencies, in particular those of interagency interest.

To address concerns about coordination of contingency planning among all levels of government, the National Response Team will develop a consistent strategy for coordination among federal, state, and local planning and response groups. Such a strategy should focus on ways to bring such groups together to discuss common problems, and review and explore approaches to planning and response. As a part of this effort the NRT, working through the RRTs and Area Committees, will develop a strategy for establishing appropriate liaisons with the governors of each state, mayors, and other chief executives of local government. This is to strengthen coordination among federal, state, and local response agencies.

In order to address the other concerns raised by this report, additional work is necessary. Therefore, a second phase will be undertaken to achieve the task of further improving the hazardous materials safety system. Additional research will include detailed technical, institutional and legal opinions, in keeping with the concerns of the stakeholders and such changes, as may be necessary, will require the viewpoints of the broad constituencies with a primary stake in the system and its improvements. The success or failure of this phase will be determined by the extent to which it addresses the needs and problems of the local planning and response bodies and of the regulated community.

This second phase would:

- Identify and develop the technical options and changes necessary in each of the issues outlined;

- Develop regulatory and/or statutory changes, if necessary, for the issues defined above; and

- Develop detailed strategies for streamlining and consolidating accident prevention, preparedness and response functions within the Executive Branch in those areas cited by this document.

Phase two will be led by the EPA in consultation and coordination with the National Response Team. This phase will also include stakeholder participation.